THE PEAKS OF MEDICAL HISTORY

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Statue of Aesculapius, in the Capitoline Museum, Rome.

THE PEAKS OF MEDICAL HISTORY

AN OUTLINE OF THE EVOLUTION OF MEDICINE
FOR THE USE OF MEDICAL STUDENTS & PRACTITIONERS

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ILLUSTRATED WITH 43 FULL-PAGE PLATES
AND 16 TEXT ILLUSTRATIONS

SECOND EDITION

PAUL B. HOEBER, INC.
NEW YORK · MCMXXVIII

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By PAUL B. HOEBER, Inc.

Published April, 1926
Second Edition Revised, December, 1927

Printed in the United States of America

To

LIEUT.-COLONEL FIELDING H. GARRISON
MEDICAL CORPS, U. S. ARMY

"*. . . bonis literis*
Haud leviter imbutus"

PREFACE TO THE SECOND EDITION

THE call for a second edition of the "Peaks" in so short a time is of course a gratification and a stimulus to further improvements in its make-up. Comments on the work, so far made, have mostly been those of approval.

Some practical criticisms have been contributed involving minor slips in the wording of a legend, or some inaccuracy in typography. Naturally these defects have been carefully attended to.

I am making no special change in this second edition. A few illustrations have been added. I hope that sometime in the future I may be able to make important and helpful additions to the text. The subject of Medical History often inspires the historian to expand his story.

CHARLES L. DANA.

NEW YORK, N. Y.
November, 1927.

PREFACE TO THE FIRST EDITION

MY plan in writing the present work was to present with especial brevity and proper consecutiveness the main facts of medical history, bringing the story down and into the nineteenth century.

I also greatly desired to emphasize the high spots in the evolution of medicine, so that a student could in a short time obtain a visualization of the subject as a whole, and thus get a background upon which he could work out details in accordance with his interests and tastes. To do this, I have introduced a diagram, with an exposition, of medico-historical "peaks," and I strongly urge the practical importance to the student of knowing these peaks well, even if the serious historian should take some issue as regards their absolute correctness.

I have interested myself also in a special method of illustrating medical history. I naturally put value on publishing portraits of our great leaders; but I put more value on those illustrations which indicate medical activities, such as are connected with operations, hospital buildings and colleges, as well as social conditions and the doctor's mode of living and working. I, in fine, have tried to make my illustrations *kinetic* rather than static in their character and to give social atmosphere to a text which is preponderately biographical.

I have added a chapter on the early half of the nineteenth century in which I give a general sketch of the work of that period in Paris, Ireland, Great Britain, Germany and the United States.

My friend, the historian, Dr. Fielding H. Garrison, has been very kind in regard to my work. He has gone over it with care and has, I am sure, eliminated some of its infelicities and I trust all of its serious errors of statement.

CHARLES L. DANA.

NEW YORK, N. Y.
March, 1926.

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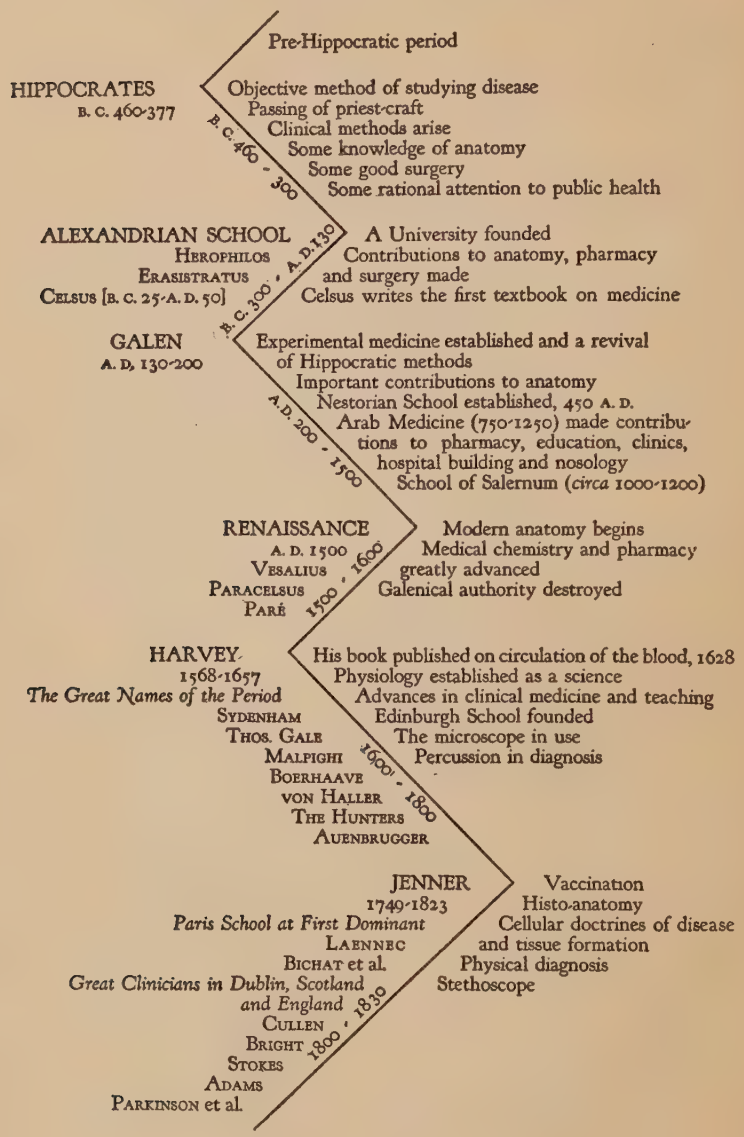
THE PEAKS OF MEDICAL HISTORY

OUTLINE OF THE SIX PEAKS OF MEDICAL HISTORY

FROM HIPPOCRATES TO JENNER



[From Galen: De Simplicium, Venice, 1625.]

THE PEAKS OF MEDICAL HISTORY

I
INTRODUCTION

OF all sciences, the medical have been the slowest in growth, considering the amount of attention that has been given them. There are but few branches of medicine, even now, which have reached the position of true sciences, and the venerable reproach that medicine is only a matter of fashion and empiricism is still flippantly thrown at the profession. In this regard, a study of medical history will show that the present status of the profession is not the result of the work done in the four thousand years of its existence, but of the last four hundred years of rational investigation. Medical science, therefore, is in reality of comparatively new growth and to be estimated from this viewpoint. Furthermore, we find that, although some branches of medicine are not yet sciences, yet each of them is established on a scientific basis and is gradually becoming more and more the organized growing body of real knowledge which a science is held to be.

In the history of medicine, there is no more notable feature than this prolonged absence of all real progress. As with other branches of science, however, it is not difficult to discover causes for this phenomenon, causes in this case peculiar to medicine itself: the ancient prejudice against dissection, which kept back anatomy and physiology for two thousand years, or the method of Aristotle which loftily aimed to turn medicine into philosophy, and thus became its bane.

Then, too, the innate horror of sickness and death in the primitive mind made mysticism and quackery more acceptable than patient or sensible work, as shown in the popular manifestations of mesmerism, animal magnetism, spiritualism, phrenology and so forth, which have always diverted ambitious wanderers from the true fields of science. There was for centuries, too, an absurd prudery, which retarded the development of obstetrics and gynecology, while the low repute attached to surgeons hindered the growth of their science for more than a thousand years.

Agencies such as these were continually hampering the progressive energies of medicine; and this was to go on until humanity had reached the state of intellectual freedom and civilization which distinguished so brilliantly the seventeenth century. We find the first and longest stage of medical history beset, therefore, with futile theories, with stupid routine, to the neglect of scientific investigation and the disgrace of medicine as an art. Only here and there in its story does a man of genius appear, who sees what his profession needs and contributes to its advancement.

The history of medicine may be divided into periods. The first commences with the dawn of history itself and ends with the Coan and Cnidian Schools of Greek medicine which open the second period, viz., that of Hippocrates (460 B.C.); the third, that of the Alexandrian School (about

The oldest known illustration of infantile paralysis.
From a Egyptian stele now between 3000 and 4000 years old.

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300 B.C.), ends with the appearance of Galen; the fourth is the period of Galen (130 B.C.) which ends with the sixteenth century and the fifth or Renaissance period of medicine under Vesalius, Paracelsus, Paré and Harvey; the sixth is the period of theories and speculations, and ends with Jenner (1800); the seventh is the period of the arrival of modern medicine and covers the nineteenth and twentieth centuries.

In the periods of Hippocrates and of Alexandria we discern the gradual separation of the healing art from priestcraft, which has always been the cradle, as it might also be the grave, of medicine, and its development from jugglery and rude empiricism to a learned profession, with no inconsiderable scientific status and a high but neglected code of ethics.

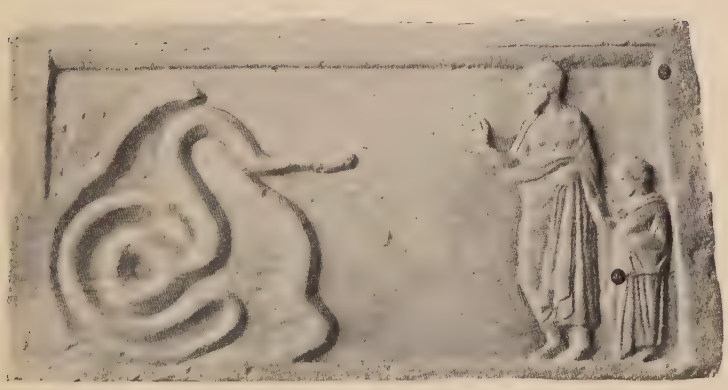
Pre-Hippocratic Period

The Egyptians and the Assyro-Babylonians were the oldest cultivators of medicine. The former embodied their knowledge in different compends or encyclopedias, inscribed in hieratic script on papyri. Several medical papyri have been discovered and republished with translations, so that a very good idea may now be formed of the medical knowledge of the Egyptians. Their medicine was in the hands of the priests who kept their knowledge in their own craft. They had specialists who attended separately to the eye, the ear, the teeth and all other parts of the body. Their materia medica was quite extensive and chemistry and pharmacy were practiced. But their knowledge was not, on the whole, either accurate or extensive. Dissection was a sacrilege. Except through the meager knowledge gained in embalming, they were not acquainted with anatomy, which could not and did not exist. But the text of the Ebers Papyrus is well arranged, contains prescriptions and recognizable accounts of parasitic infections, also a very sensible paragraph on the treatment of fatty tumors. There is a small pediatric section.

THE OATH OF THE HINDU PHYSICIAN

YOU MUST BE CHASTE AND ABSTEMIOUS · SPEAK THE TRUTH · NOT EAT MEAT · · CARE FOR THE GOOD OF ALL LIVING BEINGS · DEVOTE YOURSELF TO THE HEALING OF THE SICK EVEN IF YOUR LIFE BE LOST BY YOUR WORK · DO THE SICK NO HARM · NOT · EVEN IN THOUGHT · SEEK ANOTHER'S WIFE OR GOODS · BE SIMPLY CLOTHED AND DRINK NO INTOXICANT · SPEAK CLEARLY · GENTLY · TRULY · PROPERLY · CONSIDER TIME AND PLACE · ALWAYS SEEK TO GROW IN KNOWLEDGE · · DO NOT TREAT WOMEN EXCEPT THEIR MEN BE PRESENT · NEVER TAKE A PRESENT FROM A WOMAN WITHOUT HER HUSBAND'S CONSENT · · WHEN THE PHYSICIAN ENTERS A HOUSE ACCOMPANIED BY A MAN SUITABLE TO INTRODUCE HIM THERE · HE MUST PAY ATTENTION TO ALL THE RULES OF BEHAVIOR IN DRESS · DEPORTMENT · AND ATTITUDE · · ONCE WITH HIS PATIENT · HE MUST IN WORD AND THOUGHT ATTEND TO NOTHING BUT HIS PATIENT'S CASE AND WHAT CONCERNS IT · · WHAT HAPPENS IN THE HOUSE MUST NOT BE MENTIONED OUTSIDE · NOR MUST HE SPEAK OF POSSIBLE DEATH TO HIS PATIENT · IF SUCH SPEECH IS LIABLE TO INJURE HIM OR ANYONE ELSE · · · IN FACE OF GODS AND MAN · YOU CAN TAKE UPON YOURSELF THESE VOWS · MAY ALL THE GODS AID YOU IF YOU ABIDE THEREBY · OTHERWISE MAY ALL THE GODS AND THE SACRA · BEFORE WHICH WE STAND · BE AGAINST YOU · AND THE PUPIL SHALL CONSENT TO THIS · SAYING · SO BE IT

Achilles binding the arm of Patroclus.
(From a Greek vase. Fifth Century.)



Zeus in serpent form. Attic votive tablet, B.C. 400.

The pathological findings in Egyptian mummies, including a case of Pott's disease, three thousand years old, are of unusual interest. The sources of Assyro-Babylonian medicine are the cuneiform inscriptions on baked clay tablets from Nineveh and elsewhere. Its main features were demons as causes of disease, incantations against them as preventive medicine, augury from inspection of the liver, from fetal monstrosities (birth-omens), prognosis from astrological signs, and very crude therapy, often of filthy ingredients. They had, however, many devices of modern civilization, including a code of medical ethics, with regulation of fees. That Greek medicine eventually derived some ethical and superstitious features from Egyptian and Assyro-Babylonian medicine may be taken as proved.

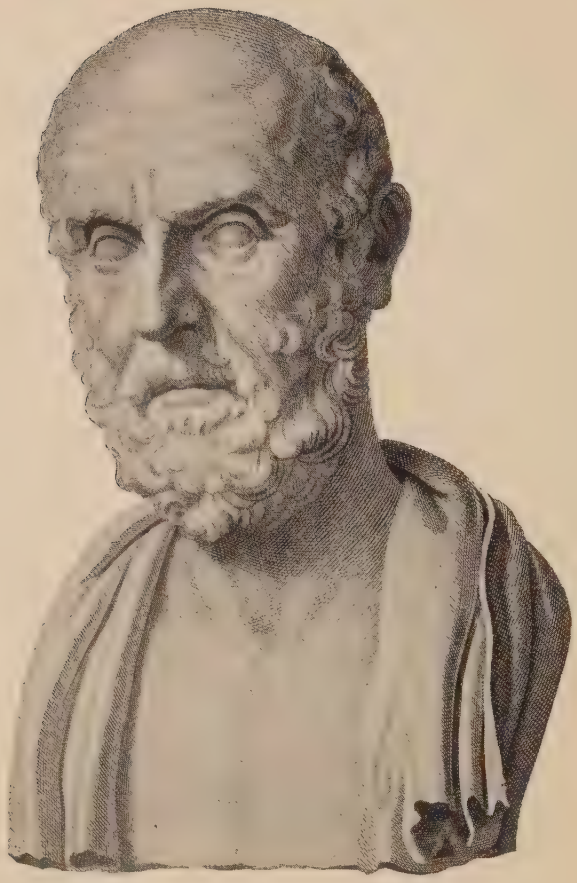
The medicine of the Chinese has been, until recent times, wholly stationary. For four thousand years they followed the aphorisms of Hoang-ti, who died B.C. 2600. A very involved lore of the pulse, an extensive but inaccurate materia medica and a prodigious faith in the efficacy of acupuncture and the moxa were conspicuous features of their medical system. Their anatomy and physiology were wholly fantastic.

This lack of progress was also true of the medicine of ancient India, which, however, attained, in a later period, remarkable skill in surgery, with well-written treatises on infant nutrition and other branches.

The Greeks were the real founders of medicine, and Aesculapius, whether a myth or not, was associated with its early development. He is supposed to have lived before the Trojan War (*ca.* 1200 B.C.) to which his sons went as surgeons to the Grecian army. Aesculapius wrought wonderful cures, even angering the gods by his skill. He was

> . . . the great master
> Who joined the limbs of torn Hippolytus
> And brought upon himself the Thunderer's wrath.

The poets made him the god of medicine and all over Greece temples were erected in his honor. In these presided a priesthood who claimed to be his lineal descendants and the heirs of his medical knowledge. They were the only physicians of those days and carefully kept in their order the secrets transmitted to them. These secrets, however, consisted of no definite, scientific knowledge either of the body or its ailments, but simply of certain hygienic rules, the use of a few medicines like emetics and cathartics, and more than all the employment of suggestion and appeals to the credulity and imagination, persuading the patient that the god was interfering to cure him. An Aesculapian temple was thus a sort of sanitarium or retreat in which hygiene, empiricism and religious imposture were practiced. The system had one good result. After a cure, it was customary for the patient to present to the god some offering, often a votive tablet inscribed with a description of his disease and of its treatment, if successful. The data on these tablets were collected and collated later, in particular by the remarkable man who founded rational and scientific medicine.



Hippocrates.
(460–377 B.C.)

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II

THE HIPPOCRATIC PERIOD

THIS remarkable man was Hippocrates, who was born B.C. 460. His father was a priest of the Aesculapian Temple at Cos, who taught his son the hereditary knowledge of medicine. But this did not content Hippocrates, who lived in the age of Pericles and had his full share of the grand spirit which emblazoned that era upon history. Hippocrates collected facts, made new observations, inculcated rational principles of investigation and separated medicine from jugglery and priestcraft. What had been the art of Aesculapius became the science of Hippocrates. He was a close and careful observer. No one ever described the symptoms of a disease with more graphic concision. He taught his followers not to be guided by theories but to notice symptoms closely and to treat each indication. Nor were they to adopt any principle which was not the rigid inference from many facts. But Hippocrates could not entirely emancipate himself from the speculative tendencies of his time. He introduced a system of physiology and pathology which was purely hypothetical, yet one which through the influence of his name lasted in a more or less modified form for two thousand years.

Hippocrates travelled extensively and made many observations upon the diseases he saw. He also acquired great renown for his cures. He drove the plague from Athens, relieved Democritus of insanity and cured the king of Mace-

donia of a wasting passion for his mother-in-law. He was noble and pure in his life and taught the highest code of morality to the members of his profession. There are about a dozen of his works now acknowledged to be authentic. These deal with such subjects as hygiene, catharsis, wounds, fractures, dislocations, epidemics and the like. His Aphorisms state in terse form the knowledge he gained at the bedside. They were admired for centuries, and a little more than a hundred years ago, the students of European schools were obliged to commit them to memory.

The distrustful public of today occasionally avows that its doctors have no skill and sighs for old Hippocrates to care for it. But this would be a dangerous wish, if it could be fulfilled. We may be very sure that Hippocrates was more behind the present age than he was ahead of his own. He knew nothing of anatomy, beyond what a skeleton and a living figure could furnish him. He did some bold things in surgery, such as trephining and tapping the abdomen, but his operations were limited and his principal success was in the reduction of fractures and dislocations. Obstetrics was then in the hands of midwives, and it is doubtful if the Hippocratic books on the subject are genuine. Chemistry did not then exist, but Hippocrates employed alum and some metals empirically, with hellebore and veratrum album for purgation and emesis. His physiology and pathology we have mentioned as gratuitous theories. They were, however, constructed in accordance with the philosophy of the time and afforded a seemingly scientific explanation of the vital phenomena. Matter was then believed to be composed of four elements: fire, water, earth and air. These gave the eight properties of hot, cold, moist, dry, hot and dry, hot and moist, cold and dry, cold and moist. Applying this, it was asserted first that the body, which consisted of solids and humors, contained

Temple of Aesculapius at Cos.

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Temple of Aesculapius at Athens.

four of the latter: blood, bile, black bile and phlegm. Of these, the blood was hot and moist, the yellow bile hot and dry, the black bile dry and cold, the phlegm cold and moist. A preponderance of any one of the humors caused a disease with the character of the humor. Thus too much bile would cause a fever, which was a hot and dry disease. Hippocrates believed also in the presence of a vital force (*vis medicatrix naturae*) diffused through the system, which guarded it against disease, or, if disease did appear, which strove to drive out the morbific agent by a process of *coction*. The moment at which this came to pass was the *crisis;* and to watching and encouraging this vital power until it produced the crisis, Hippocrates devoted his therapeutical attention. He introduced the theory of critical days which were separated by the mystic Pythagorean numbers of three and four. His two theories, then, were that of the four humors and that of coction and crisis. His two principles of treatment were the expectant and to a subordinate extent the cure of like by unlike (*contraria contrariis curantur*). In acute diseases he bled the patient and gave a famine diet until the crisis, with the generous use of purgatives. These purgatives were generally of hellebore and were drastic and dangerous. In chronic diseases, Hippocrates employed evacuants, diuretics and expectorants, with a few empirical remedies. He also inculcated hygienic rules which were for the most part sound, though incomplete.

The most valuable thing in Hippocratic medicine was the principle, which the master strongly inculcated, of making careful and extended observations, and of constructing theories only upon the basis of facts. Unfortunately, this principle was not long adhered to. The followers of Hippocrates, or Dogmatists as they were later called, soon yielded to their innate love of speculation. Dissection was still

forbidden. With such a tendency and such a prohibition, medicine could but retrograde, as it did.

Plato, who lived thirty years later (B.C. 430-348), contributed some very naïve theories to physiology. They were the result of his philosophical methods and as these affected medicine somewhat we may mention them here. He believed that all knowledge comes from within. It was to be obtained by an intellectual isolation in which the final cause is apprehended, from which the particulars are to be deduced. Proceeding on this plan, he gave to the body two souls, one for the head and one for the trunk. The latter was divided into two portions, which were separated by the diaphragm, the upper presiding over the passions and the lower over the digestive functions. Plato believed that God shaped matter formerly chaotic, into the form of triangles, as being the simplest geometrical figure. He manages to introduce this belief into his physiology, a branch of knowledge about which the "Swan of the Academy" might creditably have died before he sang.

With Aristotle (B.C. 384–322) half a century later, all the natural sciences made a remarkable advance, by which medicine was greatly affected. This philosopher introduced new methods for study and investigation. Unlike Plato, he taught that all knowledge comes from without, through the medium of the senses. He also taught that, in studying a subject, we must first obtain a general idea of it and then investigate its particulars. With these principles he shackled the world for twenty centuries. His own way of utilizing them was, however, productive of stupendous results. His pupil, Alexander the Great, supplied him with great numbers of animals from all parts of Asia and gave him opportunity to study them. This opportunity he improved by making a great many dissections, through which he

THE OATH OF HIPPOCRATES

I SWEAR BY APOLLO THE PHYSICIAN · AND AESCULAPIUS · AND HEALTH · AND ALL-HEAL · AND ALL THE GODS AND GODDESSES · THAT · ACCORDING TO MY ABILITY AND JUDGMENT · I WILL KEEP THIS OATH AND THIS STIPULATION— TO RECKON HIM WHO TAUGHT ME THIS ART EQUALLY DEAR TO ME AS MY PARENTS · TO SHARE MY SUBSTANCE WITH HIM · & RELIEVE HIS NECESSITIES IF REQUIRED · TO LOOK UPON HIS OFFSPRING IN THE SAME FOOTING AS MY OWN BROTHERS · AND TO TEACH THEM THIS ART · IF THEY SHALL WISH TO LEARN IT · WITHOUT FEE OR STIPULATION · AND THAT BY PRECEPT · LECTURE · & EVERY OTHER MODE OF INSTRUCTION · I WILL IMPART A KNOWLEDGE OF THE ART TO MY OWN SONS · AND THOSE OF MY TEACHERS · AND TO DISCIPLES BOUND BY A STIPULATION AND OATH ACCORDING TO THE LAW OF MEDICINE · BUT TO NONE OTHERS · I WILL FOLLOW THAT SYSTEM OF REGIMEN WHICH · ACCORDING TO MY ABILITY AND JUDGMENT · I CONSIDER FOR THE BENEFIT OF MY PATIENTS · AND ABSTAIN FROM WHATEVER IS DELETERIOUS AND MISCHIEVOUS · I WILL GIVE NO DEADLY MEDICINE TO ANYONE IF ASKED · NOR SUGGEST ANY SUCH COUNSEL · AND IN LIKE MANNER I WILL NOT GIVE TO A WOMAN A PESSARY TO PRODUCE ABORTION · WITH PURITY & WITH HOLINESS I WILL PASS MY LIFE & PRACTICE MY ART · I WILL NOT CUT PERSONS LABORING UNDER THE STONE · BUT WILL LEAVE THIS TO BE DONE BY MEN WHO ARE PRACTITIONERS OF THIS WORK · INTO WHATEVER HOUSES I ENTER · I WILL GO INTO THEM FOR THE BENEFIT OF THE SICK · AND WILL ABSTAIN FROM EVERY VOLUNTARY ACT OF MISCHIEF & CORRUPTION · AND FURTHER · FROM THE SEDUCTION OF FEMALES OR MALES · OF FREEMEN AND SLAVES · WHATEVER · IN CONNECTION WITH MY PROFESSIONAL PRACTICE · OR NOT IN CONNECTION WITH IT · I SEE OR HEAR · IN THE LIFE OF MEN · WHICH OUGHT NOT TO BE SPOKEN OF ABROAD · I WILL NOT DIVULGE · AS RECKONING THAT ALL SUCH SHOULD BE KEPT SECRET · WHILE I CONTINUE TO KEEP THIS OATH UNVIOLATED · MAY IT BE GRANTED TO ME TO ENJOY LIFE AND THE PRACTICE OF THE ART · RESPECTED BY ALL MEN · IN ALL TIMES · BUT SHOULD I TRESPASS AND VIOLATE THIS OATH · MAY THE REVERSE BE MY LOT

added greatly to anatomy and physiology. The dissections were confined to the lower animals, however, which accounts for some mistakes in the inferences he made from them regarding the human body. But he discovered the nerves and he taught that the heart is the origin of the blood vessels. He described the brain and its membranes. He

A medieval portrait of Hippocrates.
(Nüremberg Chronicle, 1493).

observed the use of the stomach and explained the phenomenon of rumination. He made observations, in fact, upon every organ and part of each animal he examined, and recorded some truth and some error about each. Thus he collected a vast amount of material, which is the foundation of comparative anatomy and physiology. The relation of medicine to his theories and his studies he has made familiar by the aphorism: "The philosopher should begin with medicine; the physician should end with philosophy."

Praxagoras, who lived about this time, distinguished between the arteries and veins and taught the use of the pulse in diagnosis. The name artery had previously been

given to the trachea alone, but he applied it to the arteries also, for he believed they carried only air. This air, he said, was drawn in by the lungs, to pass through the bronchioles to the pulmonary radicles and thence to the heart, from which point it was diffused through the arteries. The pulse was due to a primary vital force residing in the vessel walls. The phenomenon of blood spurting from a cut artery was explained on the theory that by the cut an abnormal condition was produced which determined blood to the artery. This theory of Praxagoras was still accepted as late as the seventeenth century.

Ptolemy Soter (*ca.* 300 B.C.).

Founder of the dynasty of Egypt, of the Museum and Library and of the Medical School of Alexandria. He was a patient of Herophilus.

Face p. 29

III

THE ALEXANDRIAN SCHOOL

WHEN Alexander the Great died (B.C. 324) Egypt fell to his brother-in-law, Ptolemy Soter. This ruler shared the enthusiasm for science of his great relative, and had much more leisure to gratify it. He established the Alexandrian library and placed Aristotle in charge of it. Through the influence of the philosopher and the king, the famous Alexandrian School was founded and it was fostered in every way by the succeeding Ptolemies. The highest estimate was placed upon learning. Study, investigation and experiment were carried on with unwearying activity. A medical school was organized which lasted so long and gained so high a reputation that even in the time of Galen, five hundred years later, it gave one the greatest prestige to have studied at Alexandria. Dissections were allowed and even encouraged. Under such stimulation, two great anatomists arose who made remarkable advances in that science. These were Herophilus and Erasistratus. The former dissected over two hundred human bodies and acquired the highest reputation for his attainments. He was the first to distinguish the nerves as organs of sensation. He described the brain with great accuracy and his name is made familiar by the torcular Herophili. The calamus scriptorius is a part of his nomenclature, as is also the duodenum. Herophilus described the course of the portal veins and was the first one of many anatomists who came very

near to discovering the circulation of the blood. Erasistratus was renowned as a physician as well as an anatomist. He performed a cure like that recorded by Hippocrates. The prince Antiochus was wasting away from a concealed passion for his mother-in-law, Stratonice. No physician had been able to discover the cause of his illness until Erasistratus, suspecting it was love, caused the ladies of the court to pass by the patient one by one, the physician meanwhile keeping his hand upon the invalid's heart. The violent throbbing, as Stratonice passed by, revealed the secret. Erasistratus discovered the tricuspid valve but, as his works have been lost, we know little more of what he contributed. He taught that the arteries contained only spirit, but that in disease the blood passed into them. This was long a prevalent belief. Erasistratus practiced surgery boldly, not hesitating to open the abdomen for abscesses of the liver or spleen. In his medical practice he was, to a considerable extent, a follower of Hippocrates.

But it was a spirit of vanity more than a true love for science which urged the Ptolemies to keep up the Alexandrian school. They only wished their city to exceed every other in reputation for letters and learning. As a natural result they accumulated a great many books of no value, and surrounded themselves with pedants more than with scholars, with seekers of reputation rather than truth. The spirit of the school, as time went on, became one of petty critical inquiry and the boastful advocacy of special theories. After Erasistratus dissection was neglected and no great contributions were made to anatomy or physiology.

About the middle of the third century B.C. the school of the Empirics rose and flourished for over two centuries. Serapion was its most prominent exponent. He opposed the Hippocratists or Dogmatists, who had by this time wandered

from the scientific empiricism which their master had taught, and contended that all valuable medical knowledge was to be obtained simply by observation upon the sick and a comparison of experiences. This school of Empirics despised the study of anatomy, physiology and pathology. It was thus built upon half-truths and contributed little to medical progress

Medicine in this period was divided into surgery, dietetics and pharmacy. This division did produce good results in surgery, although no writings of authors of the period have been preserved. We know, however, that hernia was studied, that many surgical instruments and appliances were invented and that a specialty was made of lithotomy, in which operation many gained great reputation by their skill.

Meanwhile Rome was becoming a center for medical men. These were mostly Greeks, who had studied in the Eastern schools, journeying thence to the great city to receive the fees and, generally, the contempt of the conquerors of the world. For many of these physicians were adventurers and charlatans. Cato, the Censor, often expressed his low opinion of them and considered himself a far superior physician. To prove this, he practiced on his own household, and as a result he killed his wife. These Greeks were, many of them, educated and able men although of low character, and they were considered so valuable to the state that in the general decree banishing their nation from Rome, they were excepted.

Some time after this event, about the middle of the first century B.C., there came to Rome a man of fine education and great talents, whose name was Asclepiades. He aimed to found a medical system which would harmonize with the prevailing philosophical beliefs and would, at the same time, furnish him a reputation by its novelty. Following Democritus therefore, whose doctrines were then popular, he taught that the body is made up of atoms. These had no properties

in themselves but by their fortuitous combination and unexpected encounters, properties and phenomena were developed. The human frame he declared to be a permeable

Title page of the 1657 Elzevir edition of Celsus.

structure and its various vital phenomena were produced by the passage of these atoms through the pores. In his therapeutics, he directed his attention to the opening or closing

of these pores, using principally pleasant hygienic methods.

Asclepiades was followed by Themison, who developed his predecessor's ideas into the system known as Methodism, which long had a high reputation. Themison divided all diseases into three classes, naming them, according to the state of the pores, the constrictive, the relaxed or the mixed. The name Methodist refers to the fixed methods of his treatment. Thus, diseases were divided into three stages of progress: those of development, of stasis and of decline. Each of these received a definite and specified treatment. Themison was an able man and he acquired considerable renown as a physician. During the long popularity of Methodism, it had some distinguished followers by whom its doctrines were often more or less modified, but they do not deserve a separate notice.

Meanwhile, during the first century of our era, two really eminent men arose who were not of any special school. These were Celsus and Dioscorides. The first lived at Rome, the second at Alexandria.

Celsus, a private gentleman, who compiled an encyclopedia from the Greek, wrote more especially upon surgery. He was a notable scholar and thoroughly acquainted with the work of his predecessors. Indeed, he was, in the nature of things, more of a compiler than an original observer, but he supplies us with reliable knowledge of what had been accomplished up to that time in that branch of which he wrote. We learn that operations for hernia, calculus and cataract were performed and that the ligature had been introduced to stop hemorrhage in wounds. Hydrocele was treated by excising the part, aneurysm by ligatures above and below the lesion; harelip was cured by a special operation, and amputations were performed in cases of the greatest necessity. This last was something of an advance, for Hippocrates and his successors never attempted amputa-

tion but let the limb mortify, then simply cut off the dead tissue. Almost nothing is known about the life of Celsus. From the purity and elegance of his Latin he has been called the medical Cicero.

Dioscorides equally deserves mention, for he wrote the first authentic treatise on materia medica. He was born in Cilicia but educated at Alexandria. His materia medica is written in bad Greek, arranged like a lexicon, and contains descriptions of all the known medical herbs with their properties (whether hot, cold, moist, dry and so forth) and their applications. Dioscorides was regarded as an omniscient and infallible authority on his particular subject even down to the sixteenth century. His book passed through many editions, with commentaries, the most famous of which is the Italian version of Mattioli.

The physicians at Rome during the latter centuries were far too fond of creating a sensation to receive tamely the theories of their predecessors or to be content without propounding some of their own, so that there was a great deal of wrangling, jealousy and ill-feeling amongst them. They are spoken of with deserved contempt by Cicero, Juvenal, Martial and Pliny. Thus Juvenal refers to Themison: "Quot Themison aegros autumno occiderat uno." Some of these physicians would set up small schools and lecture to all the pupils they could gather. These latter accompanied them in flocks on their visits to the sick. It was the custom to bid for a great number of students by promising to fit them for practice within six months. At that time, too, the system of polypharmacy, which originated with the Empirics at Alexandria, was greatly in vogue at Rome. A long popular remedy for epilepsy devised by Serapion shows that their therapeutic flights into unreality far exceeded the most brilliant poetic fancies. Thus we have in one prescription:

A. Cornelius Celsus.
(25 B.C.–50 A.D.)

℞ Brains of camel
Rennet of sea-calf
Excrement of crocodile
Heart of hare
Blood of turtle
Testicle of wild boar

The preparations known as theriaca and mithridate, composed of from forty to sixty substances, were long regarded as universal panaceas.

The use of public baths during these times formed part of the Roman citizen's daily life. They were extensive and beautiful structures and had every appliance that luxury could suggest. Their hygienic effect was, of course, studied, and hydropathists, who professed to cure every disease with water, flourished. The douche was, thus, first applied medicinally. Antonius Musa cured Augustus Caesar by his cold-water treatment and so achieved a temporary popularity. Cold water was too severe for the luxurious Roman, however, and Horace describes in one of his "Epistles" the feeling soon entertained for Musa and his therapeutic agent:

> For Baiae now is lost on me, and I
> Once its staunch friend am now its enemy,
> Thro' Musa's fault who makes me undergo
> His cold bath treatment, spite of frost or snow.
>
> Epis. 1, 15.

Galen. (130–200 A.D.)

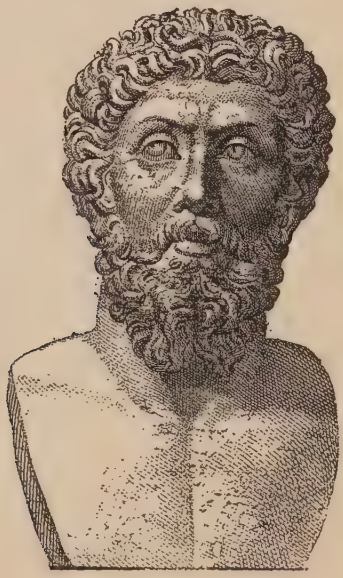
Face p. 37

IV

GALEN AND THE POST-GALENIC PERIOD

WHILE medical science was in this state Galen, "the wonderful man," came to Rome in A.D. 166. He was then thirty-four years old. Born at Pergamos in Asia Minor, his father had given him an excellent education, so that at the age of twenty-one he was erudite in grammar, history, philosophy and mathematics. Apollo however, as he says, visited him one night in a dream and directed him to study medicine, which he did. He placed himself under eminent instructors at Smyrna, Corinth and finally at Alexandria. After travelling extensively, he returned to Pergamos, where he practiced for a short time, but at length determined to go to Rome. There his brilliant talents soon gained him a reputation but his success, combined with his intolerance and contempt for the physicians of the city, also made him many enemies. Within a year he decided to leave, as he describes it, "the base jealousy and stupid ignorance of the place where shameless charlatanry usurps the confidence of a stupid and frivolous public." He returned the next year, however, but never remained in the city for more than three years in succession. At one time he travelled to Palestine and the Isle of Cyprus. On another occasion, he accompanied the Emperor Marcus Aurelius on one of his German campaigns, from which he was scared away by the appearance of the plague. He lived to the age of seventy.

Galen was an indefatigable experimenter and a prolific writer. He tried to arouse an interest in anatomy and dissection and to improve the scientific and moral status of his profession. He himself contributed to nearly every branch of medicine, and was thoroughly acquainted with all that had



Marcus Aurelius (121–180). Emperor and a patient of Galen, Marcus Aurelius is known to have said: "If you are sick do not give doctors a chance to make an ado but let life go on merrily and well." Also, "I thank the gods for my health and I thank them for the response Galen gave me when I asked help for blood-spilling and dizziness. 'That depends upon you,' he said."

been previously discovered. He took especial pains in collecting and commenting upon the works of Hippocrates. Disgusted with the numerous and absurd theories of the physicians of his time, he claimed to repudiate them all. He refers to Dogmatists, Empirics, Methodists and Pneumatists

with equal contempt. But although professing to be thus an eclectic, he followed very closely the physiological and pathological theories of Hippocrates. He merely amplified that physician's doctrines of the elements and the humors so that the description already given of them may suffice. With

Galen's theory of the circulation.

regard to the pathology, however, he asserted that all fevers are due to a degeneracy of one or other of the humors, quotidian ague, for instance, resulting from a degeneration of the phlegm. Inflammations, he said, were caused by the introduction of the blood into a place in the body where it did not belong.

Galen's knowledge of other branches of medicine was a résumé of what had been discovered by others and himself up to that time. This knowledge as well as his pathological theories also represents what was taught and accepted unhesitatingly for the next fifteen hundred years, with the exception of certain advances made in anatomy and some contributions to medicine by the Arabs. But the exceptions are not great and will hardly impair the interest which one feels in a medical system that chained the mind of a profession and ruled learned schools for so long. We may here state the main points of this old-time belief.

In physics, Galen entertained the ancient idea already given that matter was composed of four elements. In physiology and anatomy, he taught that the body was composed of solids, humors and spirits. These last were an addition to Hippocratism. They were believed to originate in the liver as *natural* spirits; these were then carried to the heart, where they united with air to form *vital* spirits. Thence they were sent through the arteries to the head where they were elaborated into *animal* spirits. The soul Galen divides into three faculties: the vegetative, residing in the liver; the irascible, in the heart; and the rational, in the brain. This doctrine is at the base of all his physiological theories. From two skeletons which he saw in Alexandria he learned what little he knew of human osteology. The rest of his anatomy was that of apes and swine. To myology he added much by his own dissections of the lower animals, and gave the names to a number of muscles. His ideas on the circulatory system were in advance of those of Hippocrates or of Praxagoras, but behind those of Aristotle. Galen taught that the veins originate in the liver (which was the great blood-making organ) and the arteries in the heart. He did assert, however (and this was a great advance), that these arteries contain

blood, or, as he says in another place, the blood and the vital spirits.

Galen first showed that the nerves originate either from the brain or the spinal marrow and he understood that some are agents of sensation, others of motion. He, however, confounded nerves with ligaments in his descriptions and taught that they spread out also into fasciae and aponeuroses (a name given by him) which received sensations.

Galen describes all the organs of the body with considerable minuteness and although sometimes inaccurate, his descriptions are a great advance upon Hippocrates and Aristotle. He thought that the glands were simply receptacles for an excrementitious humor from emunctory vessels. He never dissected them and, of course, never suggested their true function. The uterus, he teaches, has two cavities; in the right side, males are developed, in the left, females. The right testicle of the male also always generates male offspring, the left, female. Passing to the thoracic cavity, the heart he says helps to generate the vital spirits and the animal heat. The lungs he describes grossly, following the bronchi down a short distance and guessing at the rest. Respiration consists of two acts: in the first, that of inspiration, the air is drawn into the lungs; in the second, that of expiration, the impure part of the air is expelled outwardly with the "fuliginosities" of the heart, while the rest passes through the bronchioles, thence to the pulmonary vein and left heart, where it goes to make up the vital spirits, and produce the animal heat and the arterial blood.

The brain he describes minutely. He noticed the pulsation of the membranes, which he attributed to the pulmonary respiration. On inspiration, he says, the air passes into the cranial cavity through the cribriform plate of the ethmoid. On expiration part returns, bringing the excrementitious

humors which run into the nasal fossae. The subtler part of the air inspired, however, passes to the anterior ventricles and there unites with the vital spirits to form the animal spirits, which are the immediate agents of the rational soul and the subtlest of the three *pneumata!*

Galen wrote upon hygiene but he based his precepts upon false physiological theories and thus added but little to the science.

A medieval portrait of Galen.
(Nüremberg Chronicle, 1493).

There was scarcely a subject in medicine, and few outside of it, which Galen did not write about. His books number over seven hundred. It was his anatomy, physiology and pathology, however, which gave him his ascendancy.

Galen was hardly surpassed by Aristotle in extent of knowledge or subtlety of reasoning, the last quality too often marring the usefulness of the first. The finesse of his mind revealed itself even in his practice. He encouraged the extraordinary combinations of polypharmacy and introduced into diagnosis the most elaborate rules regarding the

pulse, dividing it into fifty or sixty different varieties: high, broad, low, moderate, and so forth. Galen was a man of great genius, noble ambition and marvellous learning, but far too fond of exercising his active and speculative mind. He touched nothing in medicine that he did not adorn with his learning and yet injure with his theories.

The Post-Galenic Period

But Galen gave only a temporary brilliancy to medicine. After his death there was much controversy among the schools but no real progress. Medicine became so lifeless that, with Galen, its third peak or period of development is closed. From this time on into the fifteenth century (a period called an "Age of Coma" in medicine) there is nothing in its status to please one and little of advance to give encouragement. Its condition, however, differed in different countries. In western Europe it became absolutely nothing as a science and very contemptible as an art. In the East, among the Greeks and Alexandrians the learning and skill of the ancients were kept up, to some extent, until the Arabs conquered Egypt and enfeebled the Eastern Empire. Then under the Arabs themselves, at Bagdad and in Spain, medicine in common with general sciences flourished in certain of its departments. And finally towards the close of this period it attained a respectable position in Italy.

Considering first the progress, or want of it, in Western Europe, we find that although no advance was made in medicine in the two centuries succeeding Galen, yet it was embraced by educated men and recognized as a learned profession, and official positions and emoluments were given to its members. Thus the archiater, or chief physician to the emperor, ranked with the nobility and above senators and

governors of provinces. Then in every town and province, the people elected a medical board who examined candidates, also elected by the people, for city medical officers. It was the duty of a medical officer to look after the sick poor, for which service he received a certain salary and also had some special privileges. The physician's fee was about thirty cents, but he got more if he could and, from certain laws about the matter, we must conclude that the average physician then was far more thrifty than philanthropic. By the close of the fifth century, Rome was too weak to oppose any longer the barbarian hordes which poured down upon her and the seat of empire was moved eastward to Constantinople. The whole west of Europe relapsed into barbarism, from which condition it slowly developed during the next ten centuries.

Some elements of Roman civilization withstood these degenerating influences to an extent and, especially in Italy, gave a semblance of social order and furnished seed for greater things. The Christian Church also preserved, if it did not display, scholarship and a high code of morality. But neither of these influences was sufficient to prevent the utter degradation of medicine. It fell to a great extent into the hands of the clergy, who depended fully as much upon prayers and relics as upon physic, and otherwise used their knowledge to impose upon ignorant and superstitious patients. The layman, on the other hand, who ventured to practice was regarded with scant respect and the law required hard and degrading things of him. If under his bleedings and prescriptions a common man died, he had to furnish another to his lord. If he injured a gentleman he had a fine to pay, while if the patient died the unfortunate doctor was placed in the hands of the relatives who could do with him as they chose. Possibly at that time, the mortality among physicians

measured the strength of domestic affection. It did in one case that has been recorded: The Queen of Burgundy, upon her dying bed, requested her husband, as a last favor, to have her attending physician executed immediately after her death. The bereaved husband performed the desired ceremony the next morning, and the spirits of the angelic queen and the inefficient physician took a synchronous and, it is to be hoped, peaceful flight into the unknown together.

In the eighth century Charlemagne revived the study of medicine, along with science and letters, but the revival was only temporary and no great medical names are associated with it.

When, however, three centuries later and towards the close of this Period of Coma, the Italian republics had reached a condition of flourishing life, medicine attained an elevated status socially and educationally, if not scientifically. Civilization, education and culture had never been so completely absent from this part of Europe as from more northern portions, and in the struggle away from barbarian influences Italy was several centuries in advance. By the fifteenth century she had sixteen universities, that is, as many as all the rest of Europe contained. Her various cities, Milan, Padua and Venice, patronized letters and learning, and the art of medicine was much encouraged. The famous schools at Salerno and Monte Cassino, founded by monks in the tenth century, were now brilliantly supported. Salerno especially enjoyed the highest reputation and scholars flocked to its school from all quarters. The standard of education here given was high. The candidate for admission was required to have studied logic three years, while to graduate he must have completed a five (sometimes seven) years' course at the school. He then received a degree, which Salerno was the first European university to bestow, although

the custom originated at the Persian schools established by the Nestorians in the fifth century. At the graduation, the pupil received a book in his hand, a ring was placed on his finger and a kiss imprinted upon his forehead. The ceremony was solemn and impressive, teaching him to be mindful of the sacredness and responsibilities of his profession.

But although such schools flourished and medicine was highly respected, its scientific study did not advance. Dissection was not allowed and teaching was entirely from the works of Hippocrates, Galen, Avicenna and the eminent physicians of the past. The Arabs, too, brought in much theosophy and superstition.

The rest of Europe, as stated, was far behind Italy, but by the twelfth century three famous medical schools had been established, those of Paris, of Montpellier and of Bologna, which were patronized by great numbers of young men.

We have followed the course of medicine in Western Europe among the Latins, during its age of degeneracy. Returning now to the early part of that period (350 A.D.) and passing to the East, we find the Greek mind still active and in the midst of the general degeneracy producing some brilliant teachers. There were four of these Greek physicians who were most prominent. They were all very learned men and all owe their fame largely to what they compiled rather than to what they originated. The first of these is Oribasius. He was born at Pergamos, in the fourth century, and was a contemporary and friend of Julian the Apostate. Like Galen, he was a man of great general learning and an elegant writer. At his emperor's request, he made compilations of medical knowledge as far as it was then developed, and the thoroughness and masterly manner in which he did this gained him a great reputation. He added but little to medicine himself, although a skilful practitioner, and adhered so strictly to

Galen in anatomy and physiology that he has been called the "Ape of Galen."

Aetius, who lived a little later, at the beginning of the sixth century, was not so great a man as Oribasius, but he has made a name for himself with posterity by making valuable compilations and thus preserving the work of older authors who would otherwise have been lost. He was the first prominent Christian physician but his Christianity and his medicine were tinctured with superstition.

Alexander of Tralles in Lydia, who lived in the latter part of the sixth century, successfully practiced medicine in Rome for a long time, and finally in his old age wrote out in twelve books the results of his studies and experience. He was a much more original writer than Oribasius or Aetius. He did not hesitate to differ with Galen; his teachings show that he was a rational and observant practitioner. He yielded to the superstitions of the time, however, and recommended various charms and talismans against disease.

Finally, Paul of Aegina is the last and perhaps best known of these Byzantine physicians. The school at Alexandria still existed, and there he studied. The Alexandrian school had always maintained its reputation for anatomy and surgery and Paul became especially eminent in surgery and midwifery. He is, indeed, sometimes called the founder of obstetrics, and his works show that he had considerable skill and knowledge in the science. His reputation was so great that the Arab midwives used to summon him to their help, although, ordinarily, the Arabs did not allow men to preside at accouchements.

The Greeks and the Eastern schools thus preserved to some extent the advances already made in medicine. After the time of Paul of Aegina, and following the burning of the Alexandrian library (A.D. 640) and the destruction of its

school, no other prominent medical authors are to be found in Christian Europe until the gloom of the Dark Ages begins to be dissipated in the fourteenth century. Not long after the extinction of Greek learning and the end of that nation's intellectual prominence, another race took the place of the Hellenes. The Arabs, turning with marvellous quickness from fanatical conquest to the higher pursuits of peace, soon built up schools at Bagdad in the East and at Cordova in the West. They patronized science in the most liberal spirit, and medicine, encouraged in many ways, by schools, hospitals and royal patronage, reached a very flourishing state and had a number of talented expounders.

In the East, the Academy of Bagdad was founded by Haroun-al-Raschid, the Charlemagne of the East, in the ninth century, and became the center of science and letters. A large library was collected and the works of the Greeks were translated and studied.

One of the prominent physicians of the period was Honain, who translated the Greek medical writings by order of the Caliph, earning thereby the weight in gold of each book translated. He was a Nestorian Christian and furthermore practiced the principles of his faith. The Caliph, it is said, once asked him for a drug which would slowly kill a person without revealing itself. Honain refused and was thereupon cast into prison and kept there for a year. He was then asked for the drug again and his life threatened in case of refusal; but Honain sent word that he could not comply, "for the law of his religion bade him do no evil and the law of his profession commanded him solely to help mankind." "Thy laws are sublime!" cried the Caliph, with one of those revulsions of feeling which historians sometimes give to great characters; and he made him his court physician, sure that one man at least would make no effort to poison

him. Besides Honain, there were two other prominent men who may be remembered in connection with the Eastern Arabs. These were Rhazes and Avicenna. Rhazes lived about 900 A.D. He was put in charge of the grand hospital of Bagdad and conducted it with great skill for many years, gaining the surname of "The Experienced." He was a man of extensive learning in many branches of knowledge, a characteristic of almost all the eminent physicians of ancient times, and was thoroughly acquainted with the writings of his predecessors. His great work is entitled "Continens" and consists of selections from ancient writers upon nearly every branch of medicine and surgery, together with original remarks and observations of his own. It was the note and scrap-book of a learned and experienced man, and was long a high authority. Rhazes is always to be remembered as the first one who described measles and smallpox.

Avicenna, "Prince of Physicians," was born a hundred years later (A.D. 1000) "in that delightful province of the sun," Khorassan, and his brilliant but erratic nature is indicated by the vicissitudes of his life. His talents were so great that he was made vizier, but he was soon thrown into prison, was again reinstated, then again deposed and banished from the country. An intensely hard working and very intemperate man, he died from these two causes at the age of fifty-eight. But he made nearly as great an impression upon medicine as Galen himself. He wrote a book called the "Canon," a classic and elegant work, the textbook of physicians for six hundred years. It was really, however, only a compilation, embracing the philosophy of Aristotle and the anatomy, physiology and practice of Galen. Thus, so strongly had those great men become entrenched in human opinion that not even the lively mind of the Arab could escape their influence. Their doctrines were accepted with

less and less questioning, not only because they were really brilliant and philosophical but because they were like the dogmas of the Church, "Quae semper, quae ubique, et quae ab omnibus tradita sunt."

Turning now to the Arabs in Spain, we find them equally active in medicine, but no such authority as Avicenna arose among them. The school at Cordova was, however, as brilliant as that of Bagdad, while the Cordovan library was then

A medieval portrait of Avenzoar (1133–1162).
(Nüremberg Chronicle, 1493.)

the largest in existence, numbering 225,000 volumes. It will be sufficient to refer to but two of the most prominent medical writers, Albucasis and Avenzoar. The former lived in the twelfth century and was more particularly distinguished as a surgeon and an obstetrician. His shortest but most valuable work was a book on surgery, which is very interesting as showing many instruments and operations used at that time. To obstetrics he contributed nothing of value, for Arabic

custom prohibited the existence of male accoucheurs as well as all operations involving the exposure of woman. Thus during a flourishing period of six hundred years obstetrics and gynecology were in the hands of women entirely. The corroding shackles usually put upon the enslaved sex were, for a long time, loosened and an opportunity given women to demonstrate their ability. But they gave no sign.

Avenzoar, who lived shortly after Albucasis, was the most original writer and observer of the Arabs. He added to the knowledge of diseases of the chest, describing pericarditis and inflammation of the mediastinum.

All in all, the Arabs added very little to medicine. They could not dissect, for their law forbade it; they had to take their anatomy from Galen, from whom they also took their theory and practice. Their code of philosophy was that of Aristotle. Many hospitals, however, were established by them and practical medicine was encouraged. They added also a number of drugs to the materia medica, such as alcohol, cassia, senna, manna, arsenic, copperas and borax, and were the inventors of tinctures, confections and syrups as well as pomades, plasters and ointments for surgical purposes. Chemistry owes its origin to them. But the lively fancy of the Arab could not restrict itself to the simple observation of facts and their consequences. Chemistry was not pursued as a pure science for its own sake, but the glamor of alchemy with its hopes of immortal life and incalculable riches was thrown over it. Charms, incantations and the weird vagaries of astrology were also infused into medicine, which was thus lifted from the weariness of dry detail and earthly processes to the serener atmosphere of the stars, carrying too often the patients with it.

As the Arabs gradually became luxurious, effeminate and weak, science and letters also declined, until the race was at

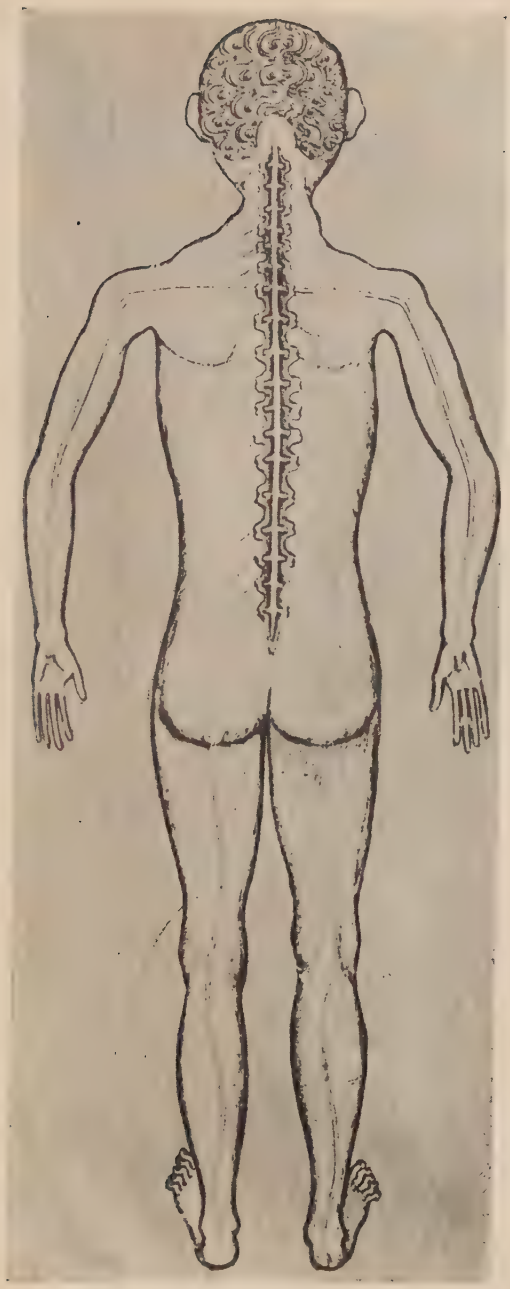
last conquered by the Turks in the East and driven from Spain in the West. After the twelfth century we hear of no great Arab names in the history of medicine.

We return therefore to Christian Europe. To this continent the progress in medicine is hereafter confined and from the time at which we now take it up, the advance in some department at least is uninterrupted although often extremely slow. We now enter the fifteenth century; the Age of Coma is over and the Age of Reform or of progressive medicine begins.

The Following Six Pictures Illustrate Anatomy, Medical Practice and Teaching during the Fourteenth and Fifteenth Centuries in Western Europe

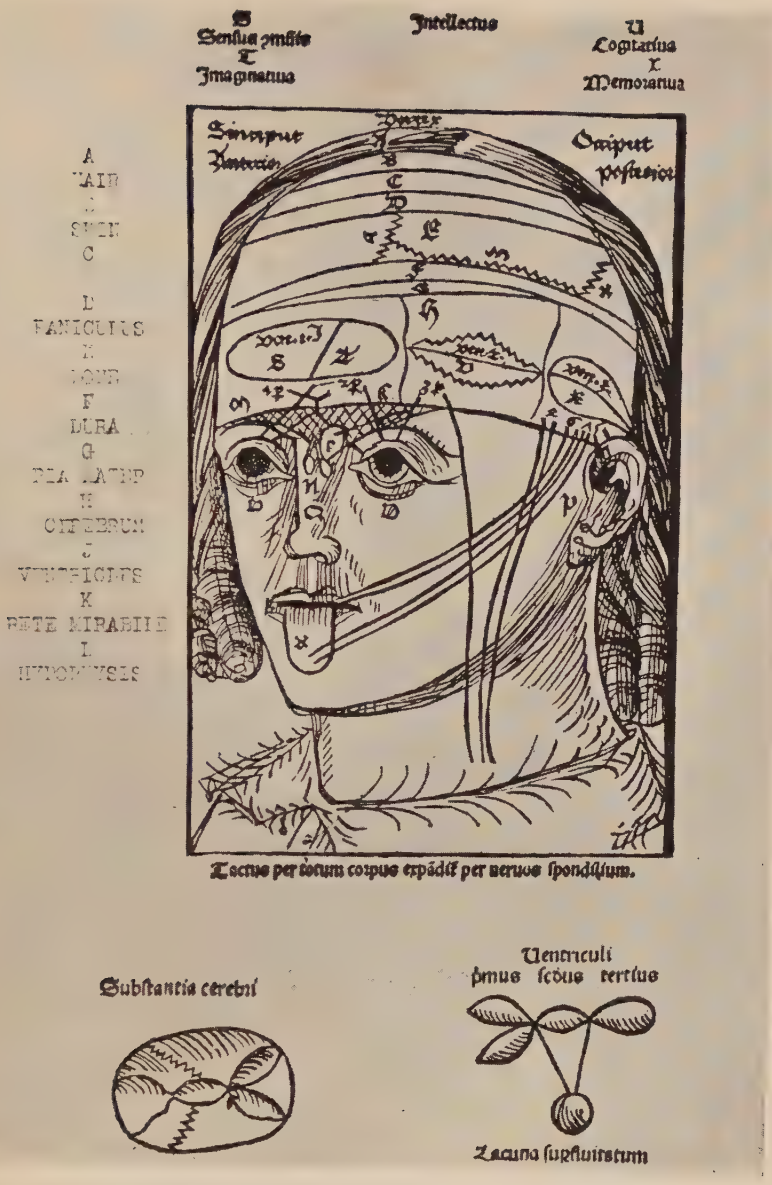
Pictures of operations as performed at Salernum in the thirteenth century. From the French translation of the Surgical Treatise of Roger Frugardi, (British Museum).

Face p. 54



The nervous system, from an illustration in the manuscript Anatomy of Guido de Vingevano (*ca.* 1350).

Face p. 54



Sectio per totum corpus extrinsecus per uenas spondilium.

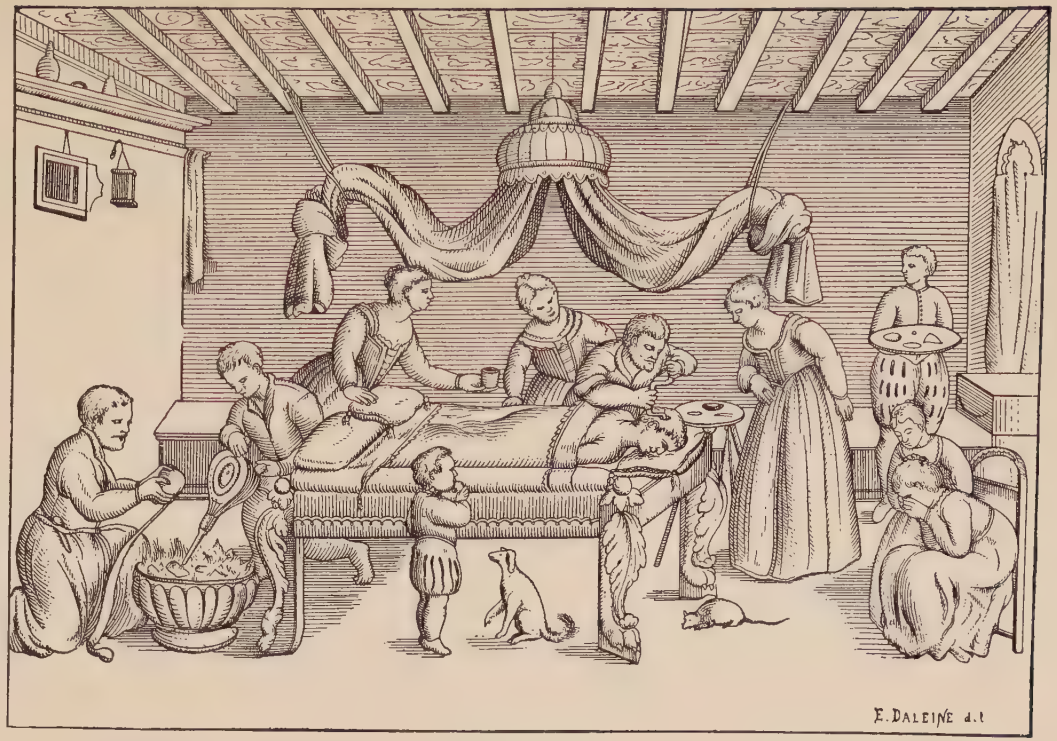
Brain and ventricles as portrayed in the works of De Ketham (Peyligk and Magnus Hundt, 1491–1501).

Practicing medicine in the year 1483.

Face p. 54

The method of lecturing on anatomy in the fifteenth century
(De Ketham, 1493).

Face p. 54



Early examples of trephining after Della Croce, Cirurgia, Venice, 1583
(Nouvelle Iconographie de la Salpêtrière, 1893).

Face p. 54

Title page of Vesling's Anatomy, 1647, showing an anatomical demonstration in an anatomical theater in the seventeenth century.

Face p. 55

V

THE RENAISSANCE OF MEDICINE

THE first two centuries of this age were so peculiar in character that they deserve a separate consideration. The medicine of this time was not absolutely reformed nor absolutely advanced; it was rather a revival of, with unquestioning obedience to, past systems. The aphorisms of Hippocrates, the voluminous dogmatisms of Galen and the canons of Avicenna formed the basis of medical instruction. It was essentially an age of fetish-worship of ancient authority. If Avicenna said that a disease was cold and moist and that such a remedy must be used because it was hot and dry, so it was believed. If Galen had announced that such and such a disease was incurable no further effort at treatment was made. This spirit extended even into the seventeenth century. When Harvey discovered the circulation of the blood, the old-school physician drew himself up scornfully and said: "Malo cum Galeno errare quam cum Harveis esse circulator." It was a singular period of really great literary acquirement and mental activity as well as of high esthetic development. But its intellectual energy was expended on quibbling over abstractions, discussing with erudition insoluble problems, exhausting ingenuity upon Aristotelian subtleties and making immense displays of pedantry and unfruitful knowledge.

It is easy to assign the principal reason for this servility to the ancients. When, through the activity of the Medici and

the capture of Constantinople, Greek literature was given to Europe, the quickened minds of the time could not fail to notice the vast superiority of the classical writings in form and substance over the uncouth and thought-restricted productions of the monks. They acknowledged this with enthusiasm

Map of medieval universities of Europe about 1450.

and so everything Greek or moulded upon Greek models was eagerly received and obediently adopted.

To the general stationary character of these fifteenth and sixteenth centuries, conveniently called the *erudite period*,

Jacobus Sylvius of Paris, teacher of Vesalius.
(1478–1555)

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Tooth-pulling in the fifteenth century
(Hans Burgkmair).

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we make two exceptions. The first is that universities and schools were increasing in number. These furnished greater opportunities for instruction and by enlarging the professional mind, prepared it for advanced ideas. The second exception is that anatomy and physiology were both energetically studied and the former science greatly perfected.

The famous school of Salerno, after four centuries of splendor, had lost its prestige, but the universities of Paris, of Montpellier and of Bologna now gained great reputation. At Paris there were, in the fifteenth century, about 25,000 students and the University of Bologna was equally well patronized. In England at the beginning of the sixteenth century Thomas Linacre founded the College of Physicians and Surgeons in London and established chairs of medicine at Oxford and Cambridge. As already stated, there were now sixteen Italian Universities, most of which continued to keep their high standing throughout the century. Hospitals and dispensaries were also established. In 1578 clinical instruction was adopted for the first time at the St. Francis Hospital in Padua.

In anatomy, the ban upon dissection had been raised sometime before, and Mondino, a professor at Bologna, in 1315 dissected a human body before his pupils. This was the first public dissection in seventeen hundred years. Mondino also wrote a little manual of dissecting which was long the standard anatomical textbook. After this time dissection was occasionally introduced in other schools, but the medieval mind could not surrender its awe and reverence for the cadaver. Dissecting was held to be so degrading that a barber's boy was hired to do it and the body then brought in to the lecture room and there discoursed upon. Not much was accomplished, therefore, as a result of Mondino's boldness, but it was the starting point of modern anatomy.

Dissection continued to be in disrepute until the sixteenth century. Then, however, the study of the human body was pursued with the greatest diligence and enthusiasm, and remarkable advances were made. Among the distinguished anatomists of this sixteenth century the student will recognize five prominent names, most of them identified with

Instruments shown in the "Fabrica" of Vesalius. Note the number and variety of the instruments used at that time (1543).

parts of the human body. They are Sylvius, Vesalius, Fallopius, Fabricius and Eustachius.

These men were all professors, Sylvius at Paris, the others in Italy. Sylvius was the first and oldest of this group. By reviving and popularizing anatomy he did great service to the science, gaining also for himself great renown. But he

could not resist the prevailing Galenic idolatry and subordinated all his discoveries to the teachings of that great man. Vesalius, his pupil for a time, was the master spirit of the science and made himself the greatest anatomist of the age. He was born an anatomist. In his boyhood he dissected animals, in his youth he pillaged the scaffold to obtain a skeleton, in his student life he sought the cemeteries at the peril of his life, and finally, at the age of twenty-three, he had made himself a reputation and was appointed professor of anatomy at Padua. He dared to deny the authority of Galen and boldly exposed his errors. In 1543, at the age of twenty-nine, Vesalius published his great work, the "Fabrica," which brought anatomy forward with an immense stride. The remaining three anatomists deserve almost equal honor for their devotion to the science and their success in advancing it. Fallopius was an elegant writer and accurate observer. Fabricius of Aquapendente was the instructor of Harvey. He made important contributions to the subject of generation, disproving the Galenic notion that the uterus has two cavities. As discoverer of the valves in the veins, he did much, not only for descriptive anatomy, but also for the great discovery which Harvey was to demonstrate. Other prominent anatomists of the period were Colombo, who did much vivisecting, and Servetus, who discovered the pulmonary circulation. Greater than all these men in some phases of anatomy was the Florentine painter and scientist, Leonardo da Vinci, the creator of artistic anatomy and of anatomical illustration. Leonardo dissected over a hundred bodies in order to prepare himself for the great anatomical treatise he proposed to write. Only the loose notes in mirror-writing on his drawings remain, but these drawings, recently published in six folio volumes, surpass any anatomical delineation of his own time or that of many years later, not only in

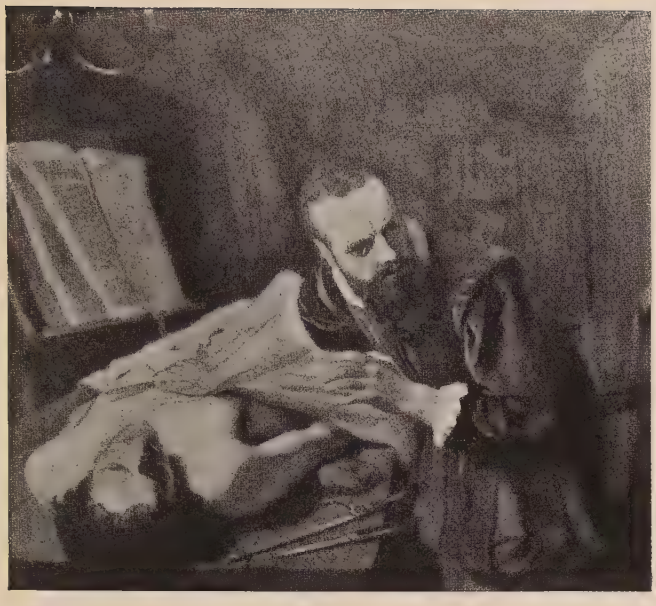
accuracy but in their express intention to elucidate physiological function.

As a result of these investigations all the grosser parts of the human body were quite accurately described. Also anatomical plates were published and used for the first time. Many erroneous ideas were exploded as, for example, that the heart had a bony structure, and that nerves, ligaments and aponeuroses were identical.

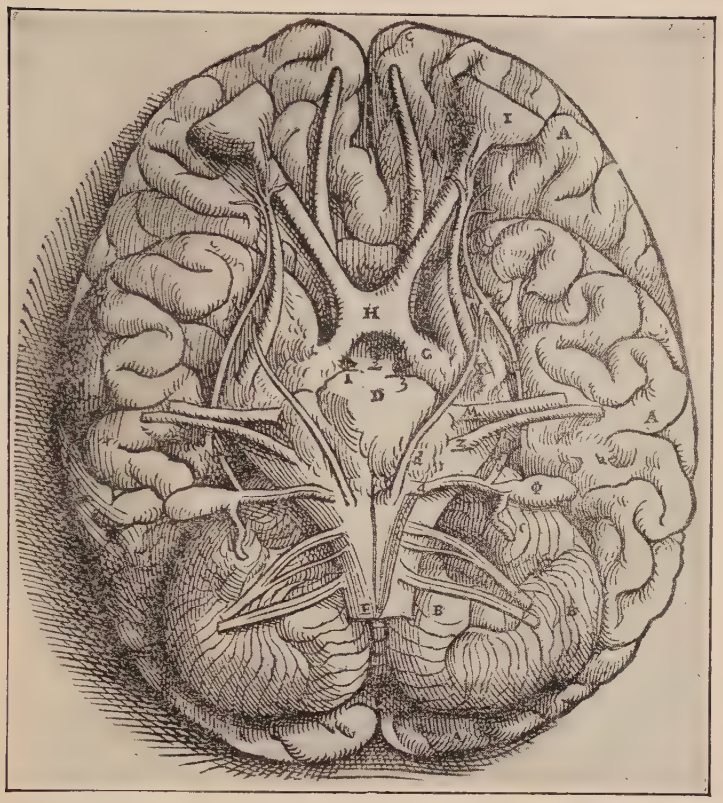
Physiology by no means kept pace with anatomy, and Galen's views still obtained wherever anatomical discovery did not contravene. Thus his notion that part of the body was nourished by semen was refuted and the blood given its own credit. Servetus and Cesalpinus came even nearer discovering the circulation than Galen had, and Cesalpinus did almost everything but say the magic word which would have kindled a soul in the dead ribs of his description.

As for practical medicine during this period, we have already stated what it was: a servile copy of the ancient practice tinctured with Arabism and alchemy. This orthodox medicine, as we may term it, culminated in Fernel, professor at Paris during the middle of the sixteenth century. He was a man of the highest talent and very eminent in other branches of knowledge besides medicine.

Fernel compressed into a systematic and classical treatise all the knowledge he could gather from Greek, Latin and Arabic books. His work represents most perfectly medicine as understood at that time. He enforced the doctrine of *contraria contrariis curantur*, recommended the expectant method of Hippocrates, systematized the materia medica and classified diseases. In diagnosis he impressed the value of the pulse and urine as the most valuable indicators, the first as showing the energy of the vital faculties and the condition of the heart and arteries, the second as revealing the quali-



Andreas Vesalius (1514–1564)
dissecting a body in secret.



The brain as shown by Vesalius (Fabrica, 1543).

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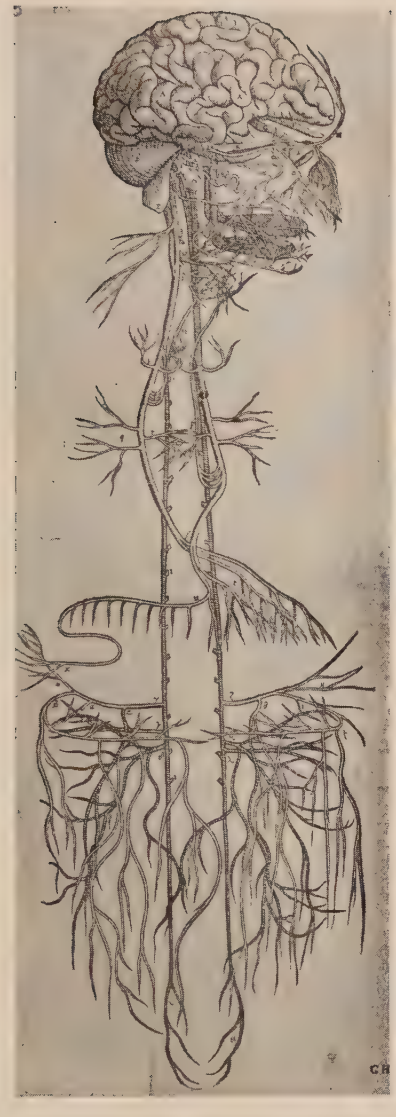

The nervous system according to Vesalius
(Fabrica, 1543).

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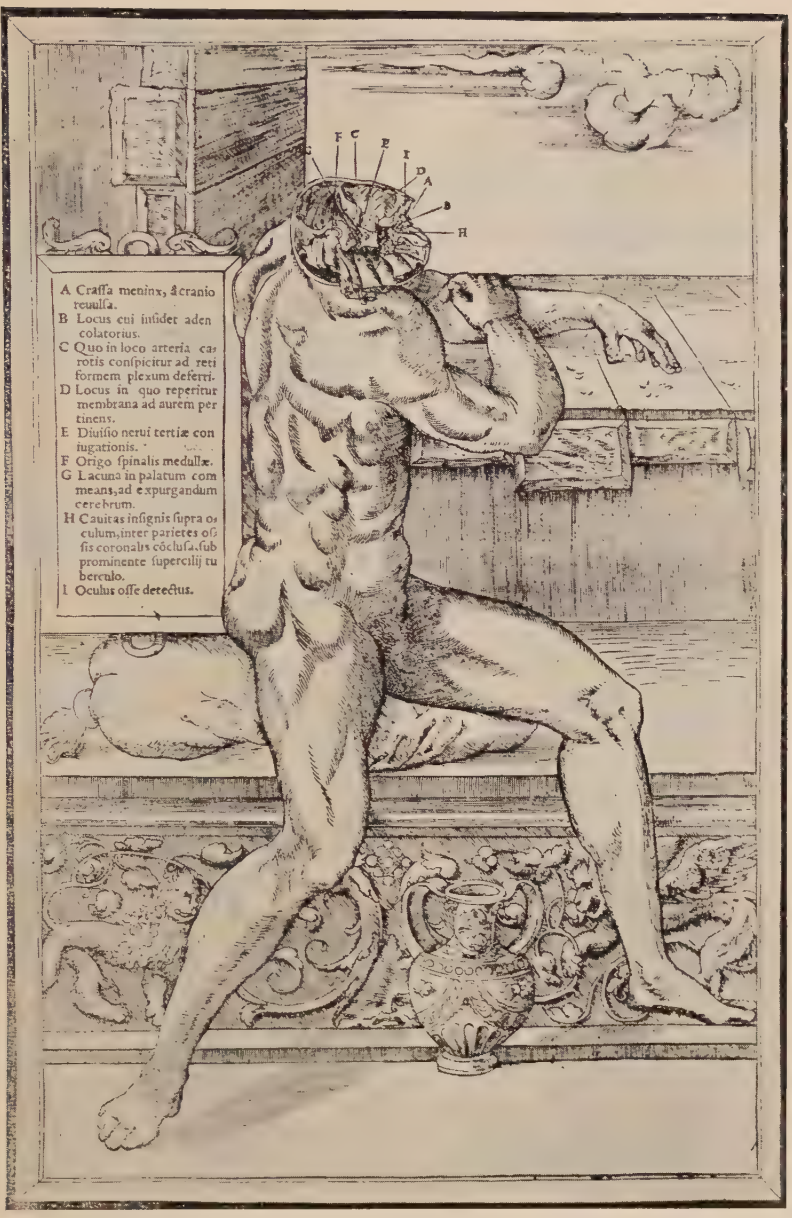
A Craſſa meninx, à cranio reuulſa.
B Locus cui inſidet aden colatorius.
C Quo in loco arteria carotis conſpicitur ad retiformem plexum deferri.
D Locus in quo reperitur membrana ad aurem pertinens.
E Diuiſio nerui tertiæ conjugationis.
F Origo ſpinalis medullæ.
G Lacuna in palatum commeans, ad expurgandum cerebrum.
H Cauitas inſignis ſupra oculum, inter parietes oſſis coronalis cõcluſa, ſub prominente ſupercilij tuberculo.
I Oculus oſſe detectus.

Illustration from the Anatomy of Stephanus, Paris, 1546.
An early work on anatomy in which science is made subservient to art.

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ties of the humors and the state of the liver and veins. "For these," he says, "hold under their dominion the whole economy." His remedies consisted of evacuants, purges and alteratives. They were mostly of vegetable origin, although towards the close of the period a school of chemical physicians began to have some prominence. Bleeding, which, following Arabic authority, had since the tenth century been employed only on a small scale, was revived after a struggle and the older methods universally adopted by the classical practitioner. The Arabs, being afraid of shedding blood, had been accustomed simply to prick the feet and let the blood ooze out drop by drop.

As regards the efficacy of the practice of the period, not much can be said. Perhaps the Jewish physician summed it up very well when he said to Lord Bacon: "Your European physicians are like your Bishops; they have the keys of loosing and binding; nothing more." The physician studied Galen instead of disease. If Galen's remedies cured, very well; if not, it was the fault of Nature, and humanity should not rebel. Diseases pronounced incurable by old authority were left to progress, without any effort against them. The result was first that the people lost confidence in physicians and fell into the hands of quacks and impostors; second, that the profession itself began to see the stupidity of its course and to contend against it. Efforts at reform began to be made in the sixteenth century. In this connection the names of Argentier, Botal and Joubert should be remembered, as well as that of Paracelsus to whom we may now refer.

Although this orthodox or classical medicine lasted even until the latter part of the seventeenth century, it lost its prestige long before and it received its first strong blow in the middle of the sixteenth century. Phillipus Aureolus Theophrastus Bombastus Paracelsus, doctor, chemist, lec-

turer, reformer, dealt it. This man, a medical graduate of the University of Ferrara, was a noisy, egotistical, but capable man, of much shrewdness and force of character, who, in

Interior of a hospital (1682).

his writings, constantly inveighs against the authority of Galen and the Arabians. He publicly burned their works and declared that there was more wisdom in the hairs of

Paracelsus.
(1493–1541)

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his beard than in all the books of the ancients, a statement at once comprehensive and ironical, as he had no beard at all. He created such a sensation by the astounding novelty of his doctrines that he gained many followers and was even

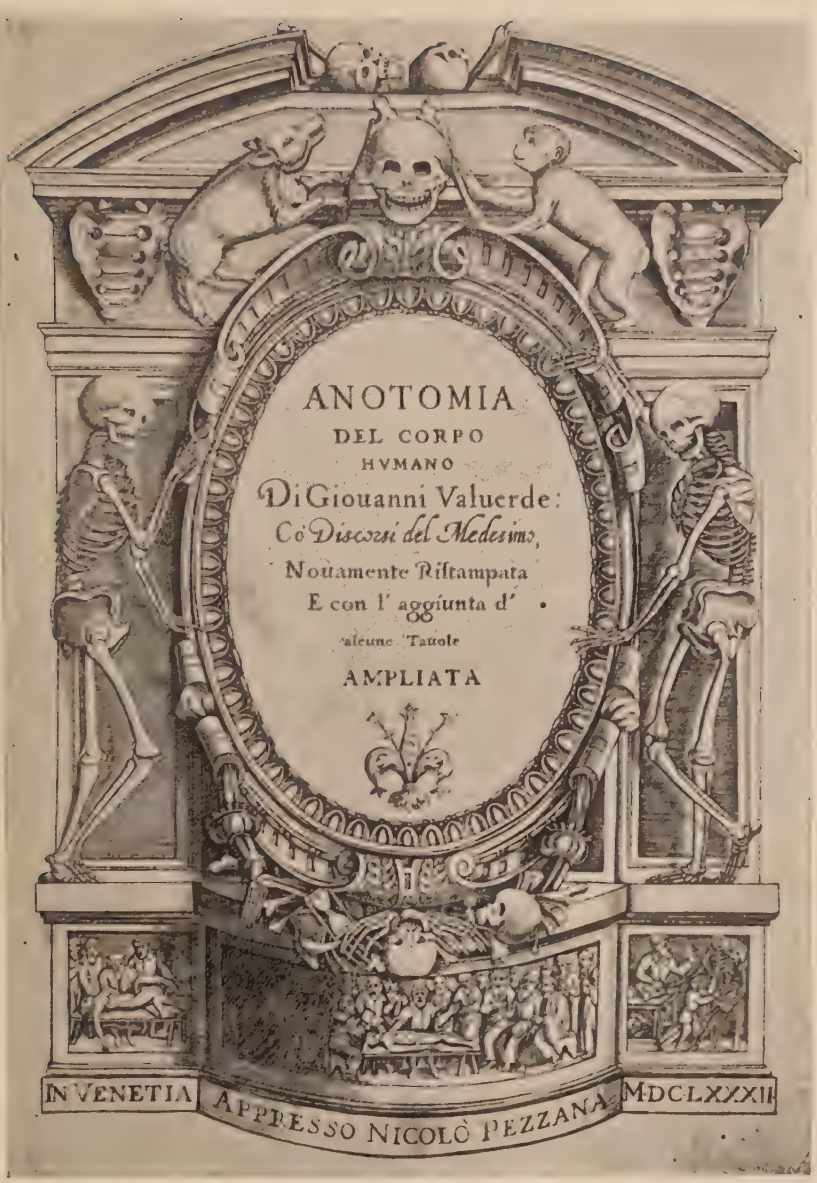
Ambroise Paré.
(1510–1590)

made professor at Basle for a time. But his rantings against ancient authority soon grew uninteresting, since he supplied no better system in place of what he would destroy. He was intemperate also and unreliable, that is to say, an arrant

liar, and he soon lost his popularity. He died from the effects of a tavern brawl in the forty-third year of his age. But though Paracelsus was vain, pretentious and something of an impostor, he had an emancipated mind and said many true things in regard to the absurdities of orthodoxy, at the same time showing remarkable insight into the ways of Nature. He saw, for instance, the relation between Alpine goiter and myxedema; he introduced chemical therapeutics, including the use of mineral baths, into medicine and was the originator of a sect of Chemiatrists, who were extremely obnoxious to the orthodox practitioner. All in all, he was a real reformer, the "Luther of Physicians," as he was called.

We have said little about obstetrics because it was confined for the most part to midwives and the professional man was called upon only in an emergency. In 1545 Thomas Raynalde published his "Byrth of Mankynde," based upon the "Rosegarten" of Eucharius Röslin (1513), which was in turn derived from Soranus of Ephesus. Upon this book most of English obstetrical practice was based during the next century. In 1668 Mauriceau published his book on the diseases of pregnant women, which was a new departure.

Surgery, which had fallen into the deepest neglect and degradation during the Dark Ages, was advanced considerably in the latter half of this period. It had been entirely disregarded by the clergy, who had fostered medicine somewhat, and what knowledge did exist was in the hands of the very lowest classes. Barbers and bath-keepers opened veins and bandaged wounds; ignorant itinerants went round to "cut for stone," and European surgery did not attempt much more than this until the sixteenth century. The king of Hungary had to advertise all over Europe for a surgeon to cure him of a wound. The standard work on surgery, during the thirteenth century, was the "Grande Chirurgie" of



From 1500 to 1800, over fifty books on anatomy were published. The above is an illustration of the type of title page used.

Saliceto, an Italian, who was a skilful surgeon for the time. During the fourteenth and fifteenth centuries and up to the middle of the sixteenth when Paré appeared, the work of Guy de Chauliac was the authority. Paré brought new ideas and infused new life into surgery. Starting as a barber's boy, his genius and conscientious labor raised him to the highest position in his profession. At his death he had been surgeon to four kings. He first came into promi-

Surgical practice in the seventeenth century. From a work entitled "Thesaurus Chirurgicae" published in 1610.

nence, and indeed at once made himself famous, by substituting the ligature in wounds for the old and repulsive method of pouring boiling oil upon them. Before Paré's time, amputations had rarely been performed on account of the difficulty of controlling hemorrhage. Guy de Chauliac had advised against amputations entirely. With Paré's device, however, such operations could be performed and became common procedures thereafter. Paré added something to almost every branch of surgery but especially to that of the treatment of gunshot wounds. His contributions to surgical science and

his own high character and devotion to his art entitle him to the high respect in which his memory is held today. A surgical college, first established at Paris in 1515, elected him a member of its fraternity, in spite of his ignorance of Latin, usually an indispensable requisite. Paré's name reflected honor upon surgery everywhere. Yet barbers were still associated with the surgeon. The college itself could only give the degree of barber-surgeon. It was not until nearly two centuries later that the degrading connection was annulled by royal edict.

There were two physicians living in the sixteenth century who were very important persons in their day. They both contributed to literature but not to progressive medicine. These persons were Jerome Cardan of Pavia and Conrad Gesner of Zurich. Cardan was a practitioner of medicine and a professor in the University. He was also a mathematician, an astrologist and a musician. Gesner was an encyclopedist, a wise physician and a very kind and philanthropic man. Cardan wrote an autobiography, "De Vita Propria," which is still a classic and is placed among the three great autobiographies of literature; the other two being Caesar's "Commentaries" and Rousseau's "Confessions."

Astrology and the making of horoscopes was still in vogue in the sixteenth century. Cardan, who knew the art, was called to Edinburgh to treat there the Archbishop of St. Andrew's. He treated him wisely and successfully; incidentally he drew his "horoscope" or "house of health." This is published in a little work entitled "De Geniturarum" ("Concerning Natal Stars").

The horoscope or "nativity" consists of a map of the heavens at the hour of birth, showing the position of the heavenly bodies from which their influence on the selected individual may be deduced. Each of the twelve signs of the

Conrad Gesner.
(1516–1565)

Jerome Cardan (1501–1576).
The great astrologer, physician and mathematician of his age.

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Venesection in the sixteenth century.

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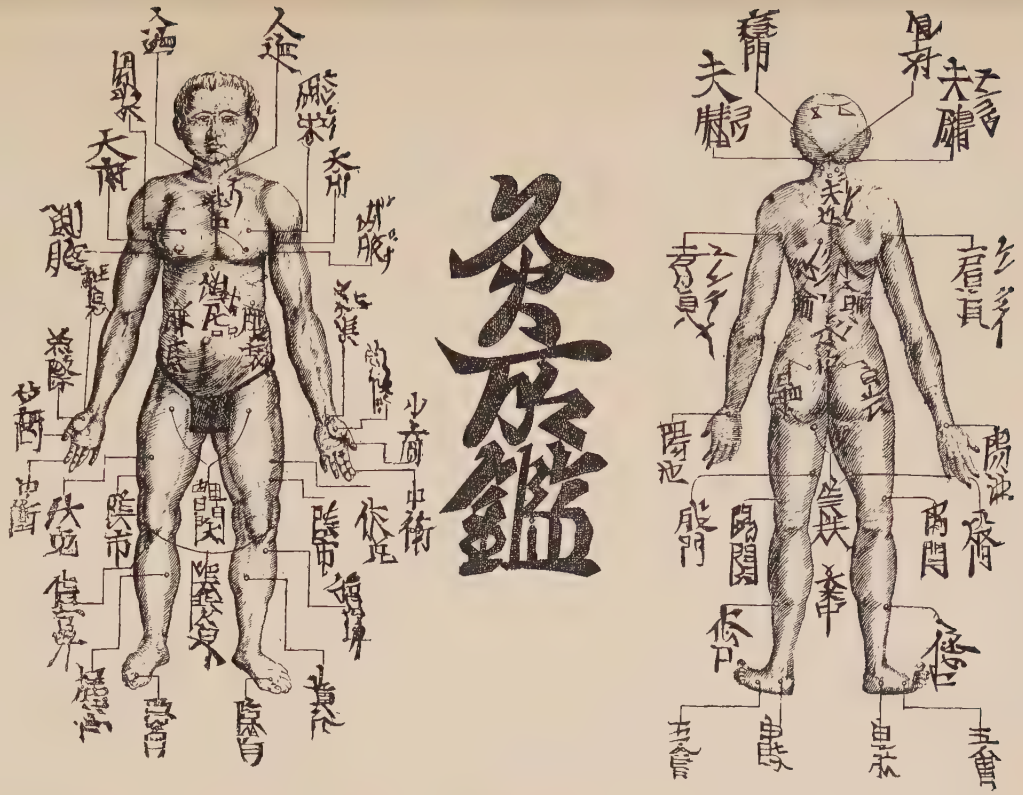

Indications of the places for applying the moxa.
(From Kemfero, 1712).

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zodiac is credited with a special influence, and one of them may be a controlling sign.

The reader may be interested in the structure of a horoscopic "house" and I reproduce that of the Archbishop here. These documents have in the past made part of the medical art and of medical history.

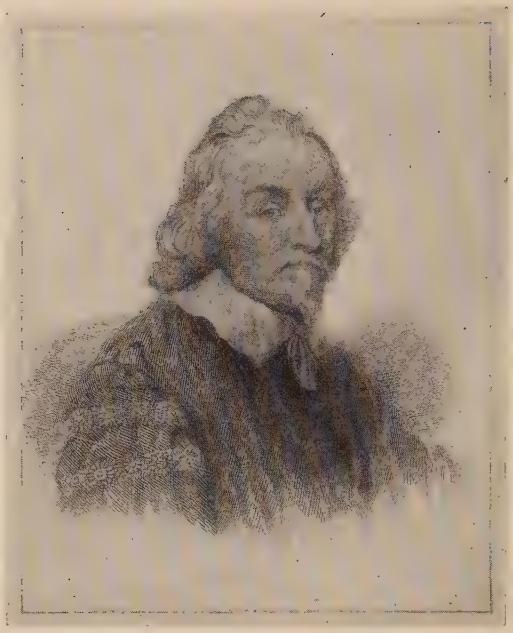
Recurring to the surgical progress made during this period, we find that besides the introduction of the ligature and the

Horoscope or house of health, drawn by Cardan for the Archbishop of St. Andrew's (Cardan: De Geniturarum, Lyons, 1555).

extension and improvement of operations for amputation, a number of old things have been revived and a number of other new things attempted. Among the operations reintroduced were trephining and couching the eye for cataract, the one from Hippocrates, the other of Alexandrian origin. Thoracic and abdominal paracenteses were also attempted and in connection with these Sanctorius invented the trocar and cannula. Tracheotomy, first described by Paul of Aegina (A.D. 625),

and castration were also performed, the latter to a frightful extent in all sorts of genital diseases. Other new operations were rhinoplasty and the high operation for stone. Gunshot wounds were of course novelties and syphilis first began to be widespread toward the close of the fifteenth century, although the oft-made statement that it was brought from newly discovered America is incorrect. Diseases of the urinary organs received some attention and great advance was made in their treatment by the use of the plaster bougie for strictures. This invention shows that the uses of royalty are various, for surgery as well as many a lay sinner must thank a king for this bougie. Henry III of France had a stricture which he was anxious to be rid of. Spurred with the ambition of expanding royal passages, a physician conceived of using the plaster bougie and with the instrument healed his patient.

Thus ends the period of the Renaissance. We have shown that although it was a time of great mental activity, a great improvement over the Dark Ages, yet its spirit was not one of general progress; although anatomy and surgery made some advances, general medicine moved round and round in the old Galenic ruts and was only partially disturbed by the incursions of a Paracelsus and his Chemical School.



William Harvey.
(1578–1657)

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VI

THE PERIOD OF HARVEY, PHYSIOLOGY AND RESEARCH

WITH the seventeenth century we enter a period of scientific research. With the beginning of this period the chains of Aristotelian philosophy begin to be loosened and the servility to ancient authority to cease; Bacon founded inductive philosophy and Descartes elucidated the principles of scientific method, all of which tended to emancipate the human mind. But in this connection we venture to doubt the oft-made assertion as to the great influence of these men upon the medical profession. Bacon said very true and sensible things about its condition and needs; Descartes contributed some very remarkable things to physiology. But we believe that the spirit of reform and progress was already infused into the study. Before the influence of these men could be felt, Vesalius had revolutionized anatomy, Paré had given a great impulse to surgery, Paracelsus and others more respectable had waked up the sleepy and contented Humoralists, and finally physiology was founded by Harvey's discovery of the circulation of the blood.

The progress which medicine made in this century was the result of the spirit of the times and of the clearer intellectual atmosphere which the centralization and greater stability of governments, the increased domestic quiet and higher social condition of the various nations had brought about.

In regard to the principal features of the first century of progressive medicine, we find at the start a grand discovery in physiology, followed up by great advances in that science and in its basic discipline, anatomy. We find also, in the first stages, a popular school of chemical physicians against whom waning orthodoxy wages fierce war, but finally is obliged to yield. Towards the close of the century, there begins to arise a sect of "mechanical" physicians or Iatrophysicists who also become popular. At the same time there are some great practitioners like Sydenham who refuse to follow any particular school and add greatly to practical medicine by their original observations.

At the beginning of the seventeenth century, we find two remarkable characters, or, more correctly one remarkable character and one remarkable man, Harvey and Van Helmont. For in Harvey's disposition and mentality there was nothing that at all strikes or stirs up the imagination. He was a patient, persistent, prosaic investigator; Van Helmont, on the other hand, was an enthusiastic, aggressive, mystical theorist. Harvey was the steadfast advocate of the testimony of the senses, of strict observation and logical inference; Van Helmont was the enthusiastic apostle of spiritual speculation, and of new and mystic ideas. But he had a pure, noble and unselfish character. He resigned both rank and wealth that he might devote himself to medicine, do something to advance the profession and ameliorate the sufferings of his fellow-creatures. His whole life was a battle against error and for what he thought the truth. He was the Descartes of medicine. He succeeded in convincing many of the absurdities of the old doctrines but could not refrain from putting a pale spectre of his own in their place. This was his theory of *spiritual vitality* which he made the basis of his physiology and pathology. Like Paracelsus, he proclaimed

Harvey's theory of circulation,
from his "Exercitatio Anatomica."

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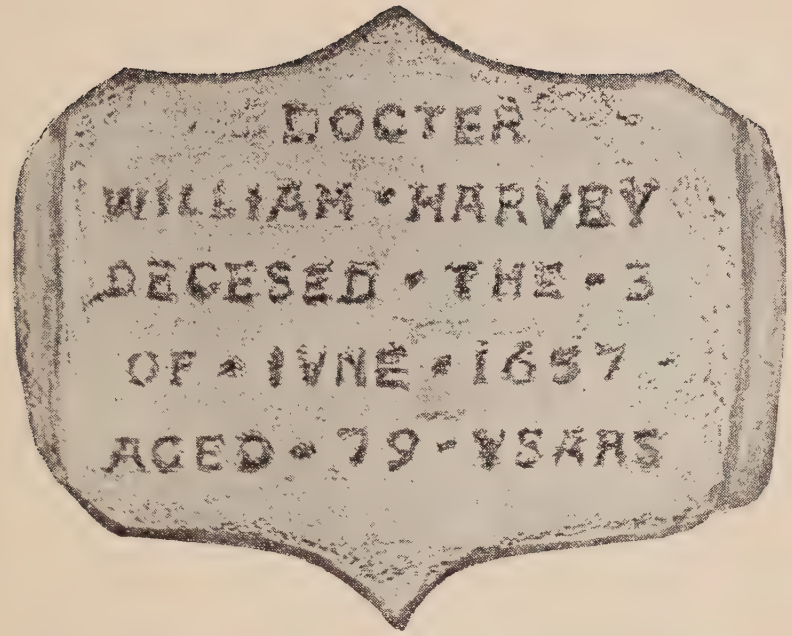

Rubbing from the breastplate of the leaden sarcophagus containing the remains of Dr. William Harvey in the Harvey vault of the parish church at Hempstead, in the County of Essex, England. This tracing was made July 23, 1880, by Dr. Weir Mitchell and presented to the College of Physicians of Philadelphia as a memorial of William Harvey.

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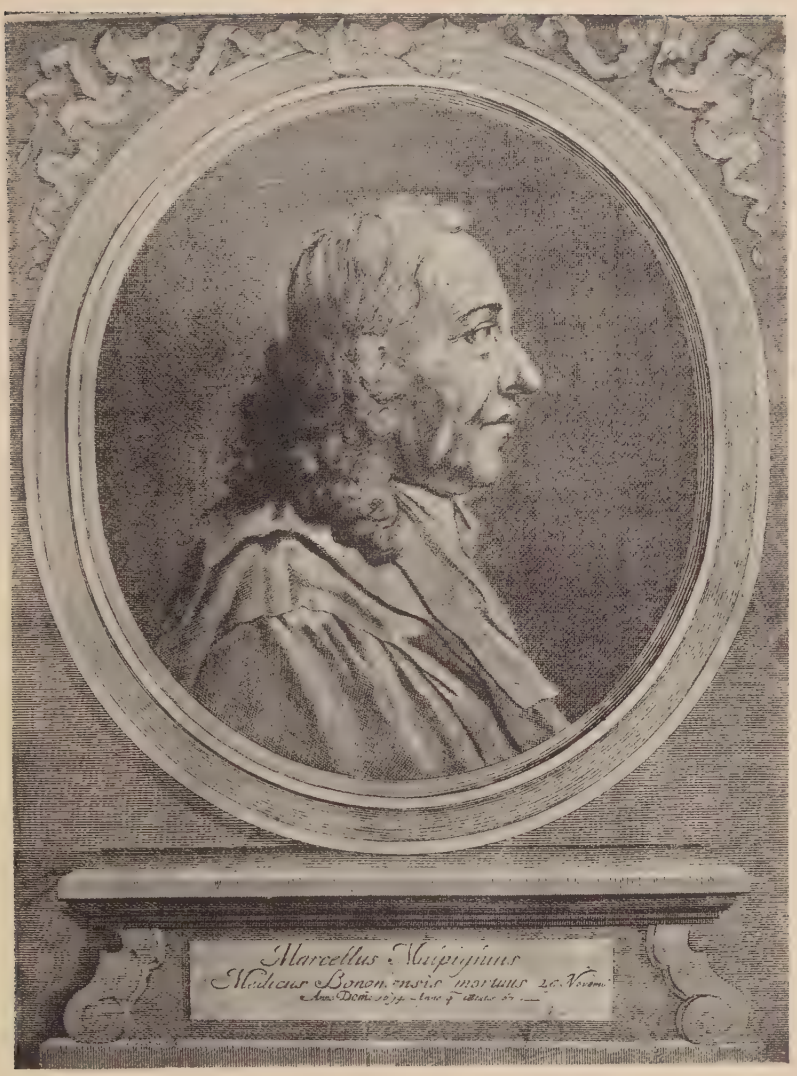

Marcellus Malpighi.
(1628–1694)

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the existence in all organisms of an *Archaeus* or spirit, which excites all vital action and rules every process in the body. The perturbations of this spirit cause disease. At such times its "motions were black as night" and to it therapeutic measures were to be addressed. Van Helmont opposed bloodletting and employed chemical remedies. Through him the chemical doctrines of Paracelsus were continued, to culminate in the work of his successor, Sylvius de le Boë of Leyden, under whose teaching chemical remedies and chemical theories became exceedingly popular.

Harvey was born in 1578. Although he lived in the bloody times of Cromwell and Charles I he was isolated from their influence by his quiet and studious character. As physician to Charles I, he was at the battle of Edgehill in 1642. On that fearful day, when the fate of his royal master and perhaps his own were so fiercely and bloodily contested, "an elderly man was seen sitting under a hedge reading a book." It was Harvey, and the book a work upon generation, a subject which he investigated with remarkable results. The physiology of the reproduction of his species was more exciting to him than the mechanics of its destruction, then being enacted before him. In 1615 Harvey lectured to the students of St. Bartholomew's Hospital on his demonstration of the circulation of the blood, fifteen years before he gave it to the world. When he did finally publish his findings, they met, of course, with great opposition and ridicule. He lost some practice and was sneered at as "The Circulator." But such persecution was mild and did him little harm. King Charles patronized Harvey and made him his court physician. Not long after, the great anatomist Malpighi demonstrated the capillary circulation from arterial to venous radicles, thus sustaining Harvey, and "The Circulator" lived to find himself honored and his discovery generally acknowl-

edged. The fact is that the discovery had been maturing for centuries; Aristotle, Erasistratus, Galen, Servetus and Cesalpino had all come very near to making it. But this does not take away from Harvey's glory in having made an independent scientific *demonstration* of the circulation, which was the starting point of experimental physiology and something quite new in his time. Harvey was a hard student, an industrious experimenter, an acute observer, earnest and careful in all his work, wonderfully clear, concise and logical in his writing. Although he disliked to differ from recognized authority, he had the independence to do so when reason and sense told him he must, while his nobility of character is shown by his tenacious clinging in spite of reproach and contumely to what he believed to be true.

By the middle of the seventeenth century the agitation over medical theories and discoveries was very fierce. So many new things had arisen and found acceptance that the lessening forces of the old school were driven to a vigorous defensive. First, there were the chemical physicians already mentioned; then the Eclectic conciliators who sought to unite the old and new schools, while the discoveries of Galileo, Kepler and Newton in mathematics and physics began to have an influence on the students of the human economy. In this way the school of mechanical physicians or Iatrophysicists arose.

Sanctorius is regarded as its precursor. He thought that the quantity of insensible perspiration given off would be a measure of the general condition of the body and therefore he ate his meals upon a pair of scales for twenty years. His experiments are today regarded as one of the starting points in the science of metabolism. The true originator of this Mechanical School, however, was Borelli, an Italian professor at Pisa. He applied the laws of mechanics to loco-

motion and other phases of muscular action, but while he made valuable contributions in this direction, such as the now accepted view of the muscular anatomy of the heart, he was led into some extravagances, such as his view that the stomach digests food principally by triturating the food and that the heart at each contraction exerts a force of 180,000 pounds.

These mathematico-mechanical ideas took firm hold on such prominent men as Bellini, Baglivi, Senac, Boerhaave and Mead. Pitcairn proposed to himself to reduce practice to the problem: "A disease being given to find the remedy," thus carrying the mathematical principle in pathology to its very farthest extent. Other absurdities of iatromathematics were the attempt to weigh a spermatozoon or to estimate a man's age from his pulse rate.

Among the few of this century who contributed directly to the advance of practical medicine was Thomas Sydenham, "*medicus in omne aevum nobilis.*" He was a natural-born treater of disease, and his life as a London physician was one of continuous success. He was a thoroughly practical man, an intelligent and keen observer. He tried to reintroduce the ancient Hippocratic method of the unbiased study of simple bedside phenomena and well deserves, for such effort, the name of the English Hippocrates. He never endorsed any of the theoretical follies of his age but held up for imitation the principles inculcated by "the divine old man." He was thus superior to Galen in that he did not wander away from them himself. He did all that learning, reason and experience could do for his patients but recognized and acknowledged the imperfections of human knowledge and resources. He made no single great contribution to medicine but described many new diseases, such as chorea, scarlatina, bronchopneumonia, gout and hysteria.

Thomas Willis, another great English clinician, first described typhoid and puerperal fevers, dementia paralytica and myasthenia gravis.

Surgery slept during this seventeenth century, preparing itself, it would seem, for the tremendous energy with which it moved forward in the next. As surgery deals with the outside, with tangible things, it afforded no scope for the scientific imaginations of ambitious theorists. Besides, as already stated, the position of the surgeon was little better than that of a barber or valet. But the advances already made were not lost. Fabry of Hilden (Fabricius Hildanus) in Germany attained a high reputation while Richard Wiseman made such valuable contributions to the science that he has been termed the Paré of England.

Turning now to the more exact branches of medicine, we find that besides the great additions to anatomy and physiology, two new sciences have been founded, those of chemistry and of obstetrics. Robert Boyle (1627–1691), a man of great learning and genius, by his investigations and experiments earned for himself the title of "Father of Modern Chemistry," and a contemporary thus expresses his esteem: "To him we owe the secrets of fire, air, water, animals, vegetables, fossils, so that from his works may be deduced the whole system of natural knowledge."

After many years, woman does contribute, from her experience, to obstetrical knowledge, and we chronicle the fact. Louisa Bourgeois, *sage-femme* to Marie de Medici, published, in 1620, some observations upon sterility, labor and so forth. But François Mauriceau, in 1668, published a work, the result of his large experience, which revolutionized old ideas and established obstetrics as a science. It was translated into many languages and exerted great influence all over Europe. Later, when Julien Clément delivered Madame de Montespan in 1670 and the Queen in 1682, male

midwifery came to be the fashion at the French Court, and was soon taken up in England and elsewhere. The Chamberlens, a family of English physicians, were the inventors of the forceps but kept the secret in their family for a long time. They finally sold it to two Dutch physicians who also refused to reveal it. It was not until 1721 that John Palfyn partly discovered the Chamberlen instrument and partly invented independently a *tire-tête* of his own which is the original of the modern forceps.

In anatomy the progress was very great and so many men became prominent in the science that we can do little more than mention their names. These names awaken memories of anatomical landmarks. Thomas Wharton, "the secretary of the glandules," made extensive researches into the structure and function of the glandular system and discovered Wharton's duct. Aselli's discovery of the lacteals and later Pecquet's finding of the thoracic duct with his description of the course of the chyle was a great advance. Bartholin, Steno and Vieussens who studied the brain, Willis who described the circle of Willis and named the cerebral nerves, all these lived during this century and greatly advanced descriptive anatomy. So also Schneider, Spigelius, De Graaf, Meibomius and Peyer are names identified with the structures they discovered. The mathematicians, Newton, Kepler and Descartes, added to our knowledge of the mechanism of vision. The use of simple microscopes and the injection of vessels were the starting points of minute anatomy or histology. Leeuwenhoek by such means discovered microscopic organisms in the tartar of the teeth and elsewhere and was the first to furnish materials and suggestions for the germ theory of disease, a theory that soon had an ephemeral popularity. Leeuwenhoek was also the first to demonstrate the existence of spermatozoa in the semen.

It is clear that this seventeenth century was one of extreme activity in medical science, and that far greater advances were made in its various branches than in any preceding hundred years.

Coming now to the eighteenth century we find that it produces still grander results. It was a time of thorough emancipation of human thought. The results of the hundred and fifty years' religious struggles which Luther initiated were displayed in the workings of the mind. The craving for liberty, temporal, spiritual, intellectual, which was the animus of the Reformation, of the Revolt of the Netherlands, of the English Revolution, of the League against the absolutism of Louis XIV, began to find that it could now indulge itself without martyrdom. The mind found itself comparatively untrammelled and it leaped forward at once into the extremes of free thought and wild speculation.

Its first far too lofty flights were not corrected until towards the end of the century, when the reactions to more sensible methods set in.

The century opens with three great teachers, each of whom stood at the head of a peculiar school. These were Boerhaave, Stahl and Hoffmann. They were all Germanic professors, the first at Leyden, the other two at Halle.

Boerhaave (1668–1738) was undoubtedly the most remarkable physician of his age. His fame was more than Continental. Letters addressed to "Dr. Boerhaave, Europe" were laid upon his table. Deputations of physicians from China arrived to consult him. His lectures were famous throughout Europe and translated into many foreign languages. His knowledge in every department of medicine was immense. He was lecturer at Leyden upon the theory and practice of medicine, upon botany and upon chemistry, and in each department he was the highest authority. In

addition, he had a large vocabulary and he was a voluminous writer, while his learning in branches outside his profession was also very extensive. But he was a superficial observer and although he acquired much that was already known he gave out little that was new, so that after his death his influence was soon lost and his reputation waned. His great contribution was bedside instruction. He re-established and made permanently popular clinical teaching. His predecessor forty years before, Sylvius de le Boë, had also employed it, but it had fallen into disuse. Boerhaave's medical theories were less distinct than those of his contemporaries, Stahl and Hoffmann. He culled from various systems and is sometimes called an Eclectic. He inclined on the whole, however, to explain vital phenomena upon the principles of mechanics, and is generally classed with the school of Borelli as an iatromechanician. Boerhaave was equally popular as a lecturer, as a physician and as a man. He was fluent, elegant, eloquent in speech; kind-hearted, unaffected and pious in character, independent in mind. He seemed to have every fine quality of the intellect except genius. Lacking that his reputation today is a reflex from the great reputation he once had.

The great theorists of this time were the two professors at Halle, Stahl and Hoffmann. These men, although colleagues and friends, were very opposite in character and mode of thought. Each of them, although lecturing from the same rostrum, was the popular head of a prominent school. Stahl was a morose, taciturn man, very dogmatic but very earnest and sincere. Hoffmann was fluent and brilliant in speech, lively and popular in manner, more interesting and magnetic in his teaching.

As to their doctrines, that of Stahl is somewhat interesting because the Homeopathists claim to find in it the seeds of

their doctrine that "disease is the material modification of an immaterial essence." It suggests that of Van Helmont: the soul, says Stahl, is the great and living force of the economy; this makes our muscles contract, our dinners digest, our tears to come. It acts *directly* upon the body in inducing all the various vital phenomena. He thus denies the existence of the vegetative soul of Plato and Galen, as well as of the vital spirits which had previously been thought to be the go-between of soul and body. His theories called attention to the great influence of the mind upon the body and were of value for this reason alone. He was the forerunner of psychoanalysis and psychotherapy. In therapeutics he taught expectant medicine.

Friedrich Hoffmann belonged to the Iatromechanical School, but his application of its principles was original. He taught that disease is due to contractions or relaxations in the radicles and capillaries of the vascular system, and his theory was termed that of atony and spasm; a sort of revival of ancient Methodism. His remedies were tonics for the atonic diseases and sedatives or antispasmodics for those which he classed as congestive and inflammatory. His system was simple but superficial; attractive but inefficient; and he did not carry his principles to their logical conclusion.

The popularity of the systems of these three men declined at their death and after them no peculiar medical theory ever gained such wide acceptance as did theirs. There was still the passionate ambition to solve the mysteries of pathological processes, but the days of pure speculation or of any general belief in pure speculation were over. The liberated mind had taken its first and wildest flights and was now learning to accommodate itself to the harness of scientific method. Yet there were three physicians who later in the century tried to establish new medical systems and who

Thomas Sydenham.
(1624–1689)

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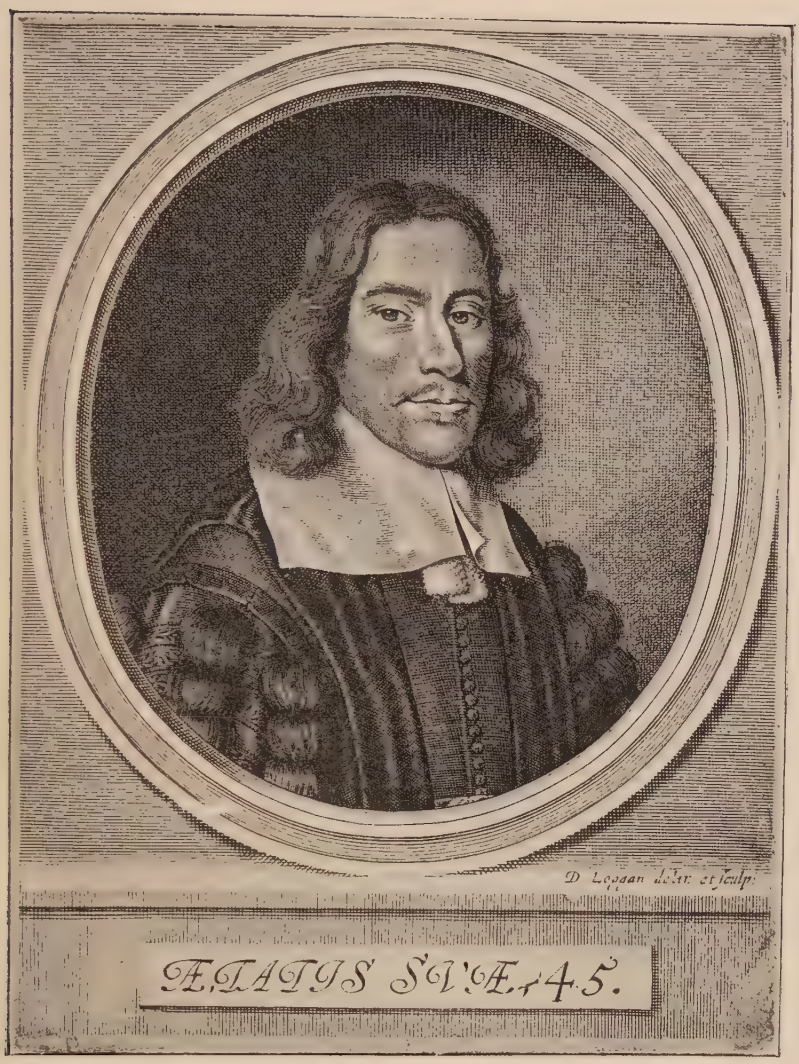
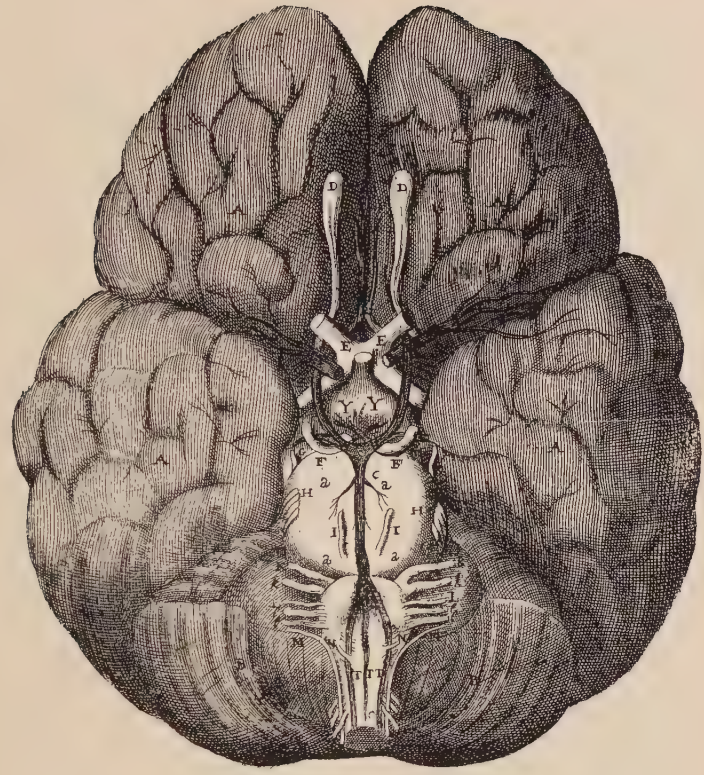


Thomas Willis.
(1621–1675)



The brain, showing the circle of Willis
(Willis: Opera Omnia, 1676).

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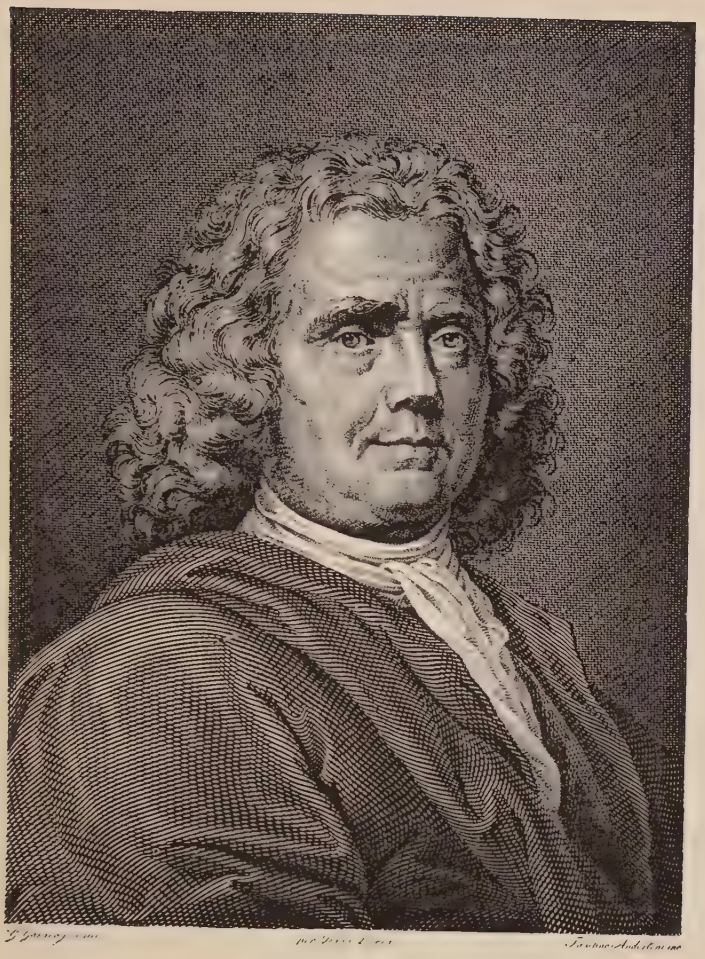

Hermann Boerhaave.
(1668–1738)

Surgery in the eighteenth century
(Hogarth).

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A German apothecary of 1774, performing a uroscopy.

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gained a great but more local reputation. These were Cullen, Brown and Darwin.

Cullen was a skilful Scotch practitioner and a very keen observer of medical phenomena. In his system he renounced the mechanical doctrines of Boerhaave and followed to a considerable extent Hoffmann's theory of atony and spasm. He also introduced Haller's newly discovered property of muscular *irritability* and made it, in connection with Hoffmann's theory, the basis of his own system. He believed that most diseases (for example, gout) were neurotic (spasmodic) in character.

Dr. John Brown was once a pupil of Cullen and the pupil's doctrines were the offshoot and development of some of the master's. Brown was a self-made man. He was remarkably apt in acquiring knowledge, and of an aggressive disputatious character, which always brought him to the front. When he had gained his education and some reputation he established himself as an independent lecturer in Edinburgh and although conceited and pedantic in his speech he had such fierce eloquence, wit and personal magnetism that he gained a large following in spite of the opposition of the Edinburgh Faculty. His doctrines were alluringly simple. All diseases, he taught, were due to the system being either overstimulated or not sufficiently stimulated, and were to be classed in accordance with that principle as sthenic or asthenic. Sedatives were to be given for the first condition, stimulants for the other. Brown arbitrarily divides diseases and remedies according to this principle, the only duty of the student being to learn the table and diagnose the disease. This system penetrated to Germany, France and Italy, in spite of the obscurity of its author, and in the first-named country created great enthusiasm and some public riots. But Brown was a man of intemperate habits and unreliable character.

He finally fell a victim to his vices, and his doctrines were soon forgotten.

Dr. Erasmus Darwin was the last who attempted to revolutionize medical beliefs. We shall not discuss his system for it gained but few followers and had little effect upon medicine. He was a very learned man and his "Zoonomia," in which his theories are presented, is a monument to his knowledge and ingenuity rather than a valuable contribution to science. He called attention to the sympathetic action of the organs in disease.

Passing from theory to practical investigation we find no name in this century more illustrious than that of Albrecht von Haller (1708–1777). He was one of the precocious boys. At the age of four, be expounded the Scriptures to his father's servants, and at ten he was thoroughly acquainted with Greek, Hebrew and Chaldee. Later he became professor of anatomy, physiology and medicine at Göttingen and there carried on the experiments by which he made every physiologist a debtor to him. He had the most inexhaustible industry as well as capacity for work and would turn off such things as reviews, novels, poems or a "Life of Alfred the Great" as a matter of relaxation. His most noted contribution to physiology was his discovery of the irritability of muscular fibers, or their inherent property of contracting upon application of a stimulus. This property had been partly surmised by Glisson of Oxford in the seventeenth century, but his views had received little attention and were by this time entirely forgotten. Haller revived, completed and demonstrated the truth of the doctrine. Besides this discovery he added so much in every other way to physiology that he is justly called the Father of the science.

A man of greater genius than Haller but of too short a life to accomplish as much, was Xavier Bichat (1771–1802).

Along with great enthusiasm for his work he possessed to an eminent degree the ability to observe, to acquire and to generalize his knowledge. He argues that there is a difference between vital and physical force, thus excluding chemistry and physics from their basic relation to physiology. This difference was acknowledged and generally conceded until lately, when the doctrine of the individuality of vital force has received its death blow at the hands of materialists. Another great contribution of Bichat was his discovery that the parenchyma of organs is made up of a few simple tissues.

Microscopical anatomists added much to their science during this century. Among the first of them was Lieberkühn, inventor of the solar microscope, with which he demonstrated in a new way the circulation of the blood.

Senac added greatly to the knowledge of the anatomy and diseases of the heart, showing the directions of its fibers and estimating its force at two hundred pounds. Thebesius also studied it and named the foramina. The lymphatic system was thoroughly demonstrated by Mascagni in 1787. The brain and the special sense organs were more fully and accurately described and the assignment of different functions to the different parts, first suggested by Willis, was carried to an absurd extent by Gall. Haller, William Hunter and Morgagni, enlarged our knowledge of the physiology of generation. The discovery of the different gases in the atmosphere by Black, Cavendish, Rutherford and Scheele, in particular the discovery of oxygen by Priestley and Lavoisier, soon led to a correct conception of the physiology of respiration, as elucidated by Lavoisier, Laplace and Lagrange.

The significance of the pulse as an indicator of disease was elaborately set forth by Théophile de Bordeu and his writings on the internal secretions have an important place in the

history of the physiology of the ductless glands. Physical exploration of the chest also originated in this century. A Viennese physician, Leopold Auenbrugger, in 1761 published a work describing the usefulness of percussion in detecting abnormal conditions of the lung. Succussion had been described in the Hippocratic writings but had never been much employed. Auenbrugger opened the way to physical diagnosis, which Laënnec developed so brilliantly in the next century.

In the same year (1761), pathological anatomy, which had received little attention before this century, was given a firm foundation as a separate branch of scientific medicine. In 1700 Théophile Bonet had published a most laborious and exhaustive compilation of the necroscopic examinations recorded before his time. The book, although only a motley assemblance of dead-house data, stimulated research by showing what there was to learn in this direction. In 1761, Morgagni published his great collection of post-mortem records in the form of letters, which not only describe many new diseases, but, as connecting for the first time the pathological findings with the bedside records, constitute the true beginning of pathology as we now understand it.

In France, surgery made most remarkable advances during this century and by the year 1800 was the peer of medicine in every respect. In 1743, the humiliating association of barbers and surgeons was abolished in France, and in 1745 the same thing happened in England. A better class of men and of minds then entered and advanced the profession. Surgical clinics were estabished at Paris and made famous by Desault. Cheselden, in England, made improvements in a number of operations; he devised the lateral method for lithotomy and also the operation for occluded pupil. Rhinoplasty was revived and improved; the tourniquet introduced.

The birthplace of the Hunters.

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Valsalva announced that deafness was often due to closure of the Eustachian tube and contributed greatly to aural surgery and anatomy. In 1750 the use of mercury in syphilis was revived. It had been used externally when the disease first appeared and later, under the teachings of Paracelsus, it had been given internally, but the ignorance of its preparation and administration made it dangerous, so that the remedy fell into disuse in favor of extracts of guaiacum and sarsaparilla. But through such preparations as Zittmann's decoction it became popular again, and its efficacy, though often disputed, has never since been really questioned.

One of the greatest lights both of surgery and physiology was John Hunter. His operation for aneurysm and his description of the hard (Hunterian) chancre make his name familiar to the student and were among his important contributions to surgery. Hunter's pioneer investigations of the blood, of the teeth, of the nature of inflammation, of gunshot wounds, of regeneration and transplantation of the tissues, make him the great founder of surgical pathology. Probably no one did so much to elevate surgery to a high rank among the sciences as Hunter.

Among the many other eminent surgeons of this time no name deserves mention more than that of Larrey, surgeon to Napoleon's army, who invented our present ambulance system of evacuating the wounded from the battlefield. His brave and untiring devotion to the wounded made him the idol of the soldiers and when he died Napoleon said that no man in all France more deserved a monument. But I have been unable to find that he got it. "Peace, alas! hath not yet her victories more renowned than war."

Clinics form so vital a part of medical instruction that a review of their origin and development is essential. The Greek physicians in Rome had a certain kind of clinical

instruction when they went from patient to patient followed by thirty or forty pupils, but it was not very systematic or effective. It may be possible that clinics were instituted in connection with the hospital and college at Bagdad during the flourishing period of Arabic power in the East, but this is somewhat doubtful. The first authentic and regular clinic was established in 1578 at St. Francis Hospital in Padua. This was soon abandoned, however, and clinics forgotten until the beginning of the seventeenth century when they were revived at Leyden under Sylvius de le Boë, already referred to as a distinguished chemical physician. These were very popular for a time but again became neglected, until in the eighteenth century they were again revived by Boerhaave. His clinics were very small but the system was novel and they became famous enough to attract scholars from all over Europe. Similar plans of instruction were later introduced in other schools. Before the end of the century they were introduced in every prominent school in Europe.

During this period obstetrics perhaps was advanced to a more scientific position than any other practical branch of medicine. The mechanism of labor was established by Auld, Smellie, Baudelocque and others; natural labor was defined; the use of pelvimeter and the forceps was taught; the signs of pregnancy were carefully defined; symphysiotomy was introduced, and contributions to every branch of the science were very numerous.

Edward Jenner (1749–1823).
Marble statue at Geneva by Monteverde.

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VII

THE PERIOD OF JENNER AND MODERN MEDICINE

F the great events in the eighteenth century none was so laborious in its accomplishment or so grand in total results as the discovery of vaccination. Jenner's character and work both inspire enthusiasm. We often hear of unselfish devotion and pure love for humanity. In Jenner we find them gloriously exemplified. When his discovery had been laid before the world and its reliability nearly established, a London physician sent him word to come up to that city and make $50,000 a year. Jenner, though a poor country physician, refused this offer, which meant essentially that he should sell his discovery. Aside from his high moral qualities, Jenner showed a marvellous power in the persistence of his investigations and in his undoubtable patience. He examined and tested his theory in every way and withheld the beliefs which must have been burning in his bosom for thirty years until he had strengthened with every possible experiment their value and certainty. The first announcement of his discovery, in 1798, was, of course, greeted with distrust and suspicion; yet it was tried and, three years later, very extensively acknowledged. City physicians however refused to accept it so speedily and through mismanagement in a hospital, where it was tested, it came near falling into disrepute. Then jealousy arose and malignant articles and even books were published against the discovery.

But through opposition, financial losses, misrepresentations and ridicule, Jenner bravely and at last triumphantly struggled, confident that through him a horrible and destructive pest would be removed from society. And he died with the nobleness of his character and the greatness of his discovery universally acknowledged. Says Coleridge: "Pronounce meditatively the name of Jenner and ask what might we not hope, what need we deem unattainable if all the time, the effort, the skill which we waste in making ourselves miserable through vice or error, and vicious through misery were embodied and marshalled to a systematic war against the existing evils of nature."

Modern Medicine. During the early part of the nineteenth century France, and in particular Paris, was the dominating medical center of the world. The men who were working and teaching during this period are familiar names in medical history. Perhaps the first and the initiator of this period of activity was Philippe Pinel (1745–1826). He was followed by Corvisart (1755–1821) who was Napoleon's favorite physician and who introduced into medical practice the use of percussion in the diagnosis of disease, calling attention to the hammer invented by Auenbrugger. Later Laënnec (1781–1826) devised the stethoscope and wrote a book on auscultation called by Osler the greatest treatise on diseases of the chest ever written. Louis (1787–1872) was the originator of medical statistics, and author of two great classics, one on phthisis (locating tubercle in the apex) and one on typhoid fever (giving the disease its present name). By his statistics he did away with bloodletting in pneumonia.

Bretonneau (1771–1862) of Tours was a great specialist in diphtheria. He and Velpeau (1795–1867) first located the lesions in Peyer's patches in typhoid. They clearly stated the doctrine of specificity in disease. Cruveilhier (1791–1873)

described disseminated sclerosis. Ricord (1799–1889), the great specialist in venereal diseases, first differentiated gonorrhea and syphilis. Many American pupils in the North Atlantic states, particularly the New England group, went to the Paris School during the years of its prosperity.

In Dublin, Graves and Stokes introduced the practice of timing the pulse by the watch; their names are associated also with Graves' disease (exophthalmic goiter) and the Stokes-Adams syndrome (heart-block). In England, at Guy's Hospital, Bright, Addison and Hodgkin, all great pathologists, described the three diseases associated with their names; and Parkinson about the same time described paralysis agitans.

In Germany, Wunderlich founded clinical thermometry, Schönlein began to lecture in German instead of Latin and described Schönlein's disease (purpura haemorrhagica). In Austria the Vienna School was developed. Skoda systematized physical exploration of the chest; Rokitansky did much for pathology. Semmelweis elucidated the cause and prevention of puerperal fever, in which his best coadjutor was Oliver Wendell Holmes.

In England dermatology was made a specialty by Willan (1757–1812) and Bateman (1778–1821). Alibert (1768–1837) added to this specialty in France and Hebra in Vienna.

In America, Otto (1774–1844) described hemophilia; James Jackson, alcoholic neuritis; John Ware, delirium tremens; J. K. Mitchell, the neurotic spinal arthropathies, and Gerhard clearly differentiated typhus from typhoid fever in 1837. Daniel Drake described milk sickness, founded medical schools in the Middle West and made a great survey of the diseases of the Mississippi valley.

Anatomy was advanced in England by the three Monros, Alexander primus, secundus and tertius, John and Charles

Bell, Robert Knox, and Henry Gray; in France by Bichat; in Germany by Henle, the founder of histology; in Austria by Hyrtl and in America by Joseph Leidy and O. W. Holmes. The development of the cell theory by Schleiden and Schwann about 1830 led to the specialization of microscopic anatomy. The foundation of cellular pathology by Virchow ultimately led to the creation of bacteriology by Pasteur, and that of antiseptic surgery by Sir Joseph Lister. John Hunter, the great eighteenth century surgeon, pathologist and comparative anatomist, was followed by John and Charles Bell, and Sir Astley Cooper, who was a great teacher and a pioneer in ligating the larger arteries. His pupil, Aston Key, tied the external iliac artery, the subclavian and the carotid. Colles described fracture of the carpal end of the radius and announced Colles' law. Syme of Syme's amputation was the teacher of Lister.

Referring again to France, Larrey, Dupuytren (of Dupuytren's contracture), Velpeau, Malgaigne and Nélaton contributed to surgical progress.

In Germany, the two Langenbecks, Dieffenbach, the elder Graefe and Stromeyer established ophthalmology; in Russia Pirogoff became a surgical leader. Orthopedic and plastic surgery were created by the work of Delpech, Dieffenbach, Brodie, Fergusson, the elder Graefe and Stromeyer.

In America, Physick of Philadelphia is venerated as the father of American surgery. Dr. John Warren of Boston amputated at the shoulder joint in 1781, and his son was an able orthopedic and plastic surgeon. Drs. Wright Post, Valentine Mott and a host of others followed Cooper as bold ligaters of large arteries; while Nathan Smith founded three medical schools and was a successful surgeon. Marion Sims, through his brilliant work on vesicovaginal fistula in 1852, created operative gynecology and had in Emmet, Battey,

Thomas, Mott, Howard Kelly and others many brilliant and well-known followers.

Later in this century (1847) surgery was revolutionized by the introduction of ether anesthesia by Morton, and by the antiseptic surgery of Lister in 1867. Dr. Crawford W. Long of Danielsville, Georgia, was the first to use ether for surgical anesthesia. In March, 1842, he removed a cystic tumor from the neck, the patient being under the influence of ether, and he subsequently used ether in other cases. Dr. Long, however, did not exploit his discovery or do anything to promote its general use by the profession; hence he did not receive the recognition which he deserved. His daughter has published a full account of his life and achievements in the *Annals of Medical History* for September and December, 1925. The invention of the laryngoscope by Manuel Garcia in 1855, and its practical use by Czermak and Türck in Austria, made laryngology a speciality. Helmholtz' invention of the ophthalmoscope in 1851 gave a new start to ophthalmology.

The revolutionary writings of Charles Darwin on evolution, natural selection, the origin of species and the descent of man, created modern biology, anthropology, embryology, comparative anatomy and physiology, the sciences of heredity and genetics and the tendency to make all branches of biological and medical science experimental. The great pioneers in this regard were Magendie, the founder of modern experimental physiology, and Claude Bernard, the creator of experimental medicine.

In physiology, Sir Charles Bell's discovery of the functions of the nerve roots, confirmed by Magendie and Johannes Müller, was the starting point of the physiology of the nervous system. The epoch-making investigations made by William Beaumont (U. S. Army) on the Canadian half-

breed, Alexis St. Martin, started the modern physiology of digestion. Claude Bernard created the physiology of metabolism (glycogenic function of liver), gave great impetus to the theory of internal secretions, and did much for our knowledge of the vasomotor mechanism. The general physiology of the circulation was greatly advanced by Carl Ludwig and his pupils and by the work of Poiseuille on the viscosity of the blood and on the measurement of blood pressure, in which Stephen Hales, an English clergyman of the eighteenth century, was the pioneer.

The foundation of bacteriology by Pasteur led to the development of the science of infectious diseases by Robert Koch, who discovered the tubercle and cholera bacilli. The development of serology and immunology was due to Roux and von Behring, introducers of the serum treatment of diphtheria. Metchnikoff, Wright and others originated vaccinotherapy; Bordet and Wassermann, serodiagnosis; Paul Ehrlich and his followers, chemotherapy against parasitic infections.

Following the foregoing general sketch of medical and surgical activities in the early half of the nineteenth century, I wish to add something regarding the personality and social achievements of a certain group of American physicians and surgeons who lived in Boston, Philadelphia and New York during this period.

In Boston, the name of Warren is associated closely with the history of American surgery and the technical achievements of those early days. Dr. John Warren (1753–1815) rendered service in the Revolution and was the first professor of anatomy and surgery in Harvard Medical School, of which he was really the founder (1783). His son, John Collins Warren (1778–1856) was a pioneer in orthopedic surgery and a very successful operator. He was founder of

John W. Francis.
(1789–1861)

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the Massachusetts General Hospital (1811) and was the surgeon who, cooperating with Morton as already stated, introduced ether in surgery.

In Philadelphia the name of Dr. Benjamin Rush (1745–1813) stands out as the leading physician of that town from the time of the Revolution until his death. Rush was a man of unusual activity in social and political life, as well as in the practice and teaching of medicine. He was a voluminous writer on many subjects and was the first in the United States to write systematically on mental disease. He is widely known in history as one of the signers of the Declaration of Independence.

A man who was equally famous so far as his professional activities were concerned was Philip S. Physick (1768–1837). Physick was a very ingenious and skilful surgeon and has already been referred to as the father of American surgery, but he did not contribute anything to the literature of his profession.

In New York City there was a very interesting and important group of medical men who flourished in the early part of the nineteenth century. The earliest of them was Samuel Bard (1742–1821). He was the founder of New York Hospital and was a physician to General Washington. His father, Dr. John Bard, was an important man in his day, having, among other things, instituted the Pest House on Bedloe's Island. Dr. David Hosack (1769–1835) was a New Yorker by birth, of Scotch descent. He was very well educated both academically and in medicine, having spent some years in Europe. He was a man of fine position socially and the most popular physician in New York during the period of his active life. He was prominent as a teacher and held six professorships during the sixteen years of his later life. He helped organize the dispensary system for New York and

founded the Humane Society. He was an important factor socially and personally as well as medically in the New York community.

A man of great surgical skill and professional importance was Dr. Valentine Mott (1785–1865). He was born on Long Island, and was unusually well educated, even becoming a well-equipped classical scholar. Mott was known as a great surgeon, but there were not so many operations in those days and the surgeons had to practice medicine also. Mott was very active in connection with the organization of the medical schools of this city, in which there was then a great deal of politics. At the beginning of the century there were two medical colleges; these became united under Columbia University in 1811. In 1826 the medical faculty revolted and organized the Rutgers Medical College, which organization lasted about five years. Dr. Mott was especially famous for the ligation of the important arteries of the body. He is said to have been the first man in this country to tie the innominate artery and he ligated the common carotid artery with success. He amputated at the hip joint and removed a whole clavicle. He is said to have done 132 important ligations. In spite of Dr. Mott's education and training, he was, like Dr. Physick, unable to contribute to literature.

The last of the New York group of which I shall speak is Dr. John W. Francis (1789–1861). He was a lecturer on jurisprudence and at one time editor of the *American Medical and Philosophical Register*. He also wrote on dipsomania and insanity, but his really important work was an historical one entitled "Old New York." Dr. Francis was a handsome man, of fine presence and very popular socially, so that he was able to give many most interesting and valuable reminiscences of the people of his day.

Portraits of nineteenth century physicians and surgeons attached to New York Hospital (1860).

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He was one of the surgeons of the New York Hospital and there were associated with him a group of men who, though they did not have quite the historical distinction of the man I have been describing, were important in their day. It so happened that the elder and later doctors were photographed together, a very interesting group, representing the physicians and surgeons connected with the New York Hospital who achieved success at a period of from fifty to one hundred years ago. I am indebted to Dr. Robert F. Weir for permission to use this portrait group.

I have given a sketch of certain early and prominent American doctors. I wish to add an account of a few others who had equal but later eminence.

Dr. W. E. Horner (1793–1853), of Philadelphia, was prominent as a teacher of anatomy and was the writer of a much used textbook. Dr. Oliver Wendell Holmes (1809–1894), of Boston, was professor of anatomy at Harvard and the earliest defender, in this country, of the view that puerperal fever is a communicable infection. Dr. Samuel D. Gross (1805–1884) of Philadelphia was a great surgeon and teacher, and was the author of the first treatise on pathological anatomy. Credit should be given him also for his most interesting book entitled "The Lives of Eminent American Physicians and Surgeons," published in 1861.

Dr. John K. Mitchell (1798–1858) of Philadelphia was the father of S. Weir Mitchell and was deservedly distinguished as a neurologist, internist, teacher and poet.

There have been many contributions to American medical biography, the earliest and quaintest being that by Dr. James Thacher, published in Boston in 1828. The whole subject of American medicine has been gone over thoroughly in works by Dr. Francis R. Packard (1901) and Dr. James G. Mumford (1903).

BIBLIOGRAPHICAL NOTES

I DO not attempt to give a bibliography of medical history in the ordinary sense. I enumerate only those important and more modern treatises which deal with the subject systematically. In these, especially in Dr. Garrison's book, there is a full record both of persons and subjects concerned with medicine.

Most of the data given by me refer to formal accounts of the lives of important individuals. To these I add interesting monographs which come in the form of small books or pamphlets dealing with special diseases or to events of special importance. I note also books that to me have a personal interest, and are perhaps often more entertaining and cultural than important historically. I would like to persuade my readers to read pleasurably of the activities and personalities of the past.

The larger and more complete Histories of Medicine in English are those by Johann H. Baas (1889), Neuburger (1906) and Fielding H. Garrison (Philadelphia, 1921). These supplement each other in a degree. My preference over all histories is Garrison's. Excellent smaller histories, dealing not always with the whole period of medical development, are "The Evolution of Modern Medicine" by Sir William Osler (New Haven, 1921), "Medical History from the Earliest Times" by Edward T. Withington (London, 1894), an "Epitome" by Dr. Park and a short history by Dr. Seelig. There are a number of very important histories in other languages, especially in German and French. The best and most recent of the German works is a medium-sized volume

by Sudhoff and Meyer-Steineg. The most helpful to me in personal research is the six-volume "Biographisches Lexikon der Hervorragenden Aerzte" by August Hirsch (Vienna and Leipsig, 1884). "Chronologia Medica, a Hand-list of Persons, Periods and Events in the History of Medicine" by Sir D'Arcy Power and C. J. S. Thompson (New York, 1923) is a very useful statistical work.

Hippocrates

Pre-Hippocratic Medicine is well described in the first sixty pages of Sir William Osler's book, "The Evolution of Modern Medicine." Other short contributions are: "The Cult of Asklepios" by Alice Walton, M.D. (Cornell Studies in Classical Philology, No. III, Boston, 1894) and "The Temples and Ritual of Asklepios" by Richard Caton (London, 1900).

The Greek text and a translation of the works of Hippocrates are given in two volumes of the Loeb Classical Library. The translator is W. H. S. Jones and the introduction tells about all now known of Greek Medicine of that day. The translation of Hippocrates by Francis Adams (London, 1849) is a standard and most valuable work. The Aphorisms of Hippocrates were translated by François Rabelais (Lugduni, 1543). A translation with the Greek text was made by J. W. Underwood (London, 1831). The most complete work on Hippocrates is the ten-volume edition of Littré (Paris, 1839–1861).

Alexandrian Medicine

The late Dr. James G. Mumford has an essay on the subject of Alexandrian Medicine in the "Proceedings of the Charaka Club" (Vol. IV, New York, 1916). Some reference to the subject, of which little is really known, occurs in all the standard histories. I put A. Cornelius Celsus in the

Alexandrian group. His book "De Re Medica" went through over one hundred editions, but I find only one English translation. This was by Dr. James Greive, "A. Cornelius Celsus, Of Medicine, in Eight Books" (London, 1756).

Galen

Galen's works in five volumes were published by Aldus in 1525. The most important modern edition is the twenty-volume Greek and Latin text of Kühn (Leipsig, 1821–1833). None of Galen's many works has ever in the past been translated into English, but now Galen's most famous treatise, his "De Usu Partium" forms a section of the Loeb Classical Library.

Interesting books on Galen are Meyer-Steineg's "Ein Tag im Leben des Galen" (Leipsig, 1913) and "Les médecins grecs depuis la mort de Galien" (Paris, 1885).

For literature of the period from Galen's time to that of the Renaissance, consult standard histories. Something will be found under the heads of Byzantine, Nestorian, Arabic and Medieval Medicine.

One should obtain and read a copy of "The Regimen of the School of Salernum." It is a short treatise on medicine and surgery for lay and family use, and is a medical classic. It was first published in the fifteenth century but there are many modern editions.

The Renaissance

Much on this subject will be found in the Life of Vesalius, by James M. Ball (St. Louis, 1910), and in the Life of Paré by Francis R. Packard (New York, 1921). The period is also discussed in the Life of Paracelsus by John M. Stillman (Chicago, 1920), as well as in articles entitled "When Apollo Strikes the Lyre" by Charles L. Dana, M.D. (Proceedings of the Charaka Club, Vol. III, New York,

1910), in "The Development of Anatomical Illustrations of the Nervous System," by Charles L. Dana, M.D. (Proceedings of the Charaka Club, Vol. IV, New York, 1916) and in a monograph entitled "Michael Servetus" by Sir William Osler (*Johns Hopkins Hosp. Bull.*, Balt., 1910, xxi, 1).

William Harvey

There are many Lives of Harvey and many single contributions in discussion and in defense of his work. The Harveian Orations delivered annually in London cover the subject in many ways. There is a Life of Harvey by D'Arcy Power (London, 1897). Dr. Garrison highly lauds Prof. John Call Dalton's "Doctrines of the Circulation" (Philadelphia, 1884). "The Pathfinders of Physiology," by J. H. Dempster, A.B., M.D. (Detroit, 1914) tells of Harvey's activity in the physiological field.

A sketch of the life of Sydenham, who lived only a little later than Harvey, deserves to be read, and can be found in David Riesman's "Thomas Sydenham, Clinician" (New York, 1926). Much can be learned of him, also, in the "Horae Subsecivae" (Spare Hours) of Dr. J. Brown (Edin., 1858).

Edward Jenner

Jenner's original announcement of his discovery of vaccination appeared in the form of a small quarto entitled "An Inquiry into the Causes and Effects of the Variolae Vaccinae" (London, 1798). It contained four colored plates. This work was followed by five successive pamphlets recording his further experiences. There is a "Life of Edward Jenner, M.D." by J. Baron (London, 1827) and many shorter accounts of his life and work exist.

Very interesting and original contributions to clinical medicine appeared at about Jenner's period, e.g., Parkinson "An Essay On Shaking Palsy" (London, 1817), Bright on disease of the kidneys, "Reports of Medical Cases" (London, 1827), William Stokes on the "Stokes-Adams Syndrome" (*Dublin Quar. J. Med. Sc.*, 1846, ii, 73), Addison on "Pernicious Anaemia and Disease of Supra-Renal Capsules" (*Lond. Med. Gaz.*, 1849, xliii, 517), and Thomas Hodgkin on the disease called by his name (*Med. Chir. Tr.*, London, 1832, xvii, 68).

A very popular book called "The Gold-Headed Cane," by Macmichael, appeared in 1827 (London). It tells the story, with illustrations, of five famous practitioners of London during the eighteenth century who successively used and passed along a gold-headed cane. This book has been recently republished (New York, 1926).

American Medicine

I have made note of certain prominent American doctors who flourished at the beginning of the nineteenth century, but I have not tried to describe the evolution of medicine in the United States. The literature of the subject is already abundant and accessible. An authoritative and critical account of this literature was written by Dr. John S. Billings (in "A Century of American Medicine," Philadelphia, 1876). A systematic history of American medicine was written by Dr. James Mumford in 1903 and one by Dr. Francis Packard in 1901. A new edition of the latter work will soon appear.

In concluding these notes and comments on bibliography I wish to suggest to my readers an easy and agreeable way to learn something about the medicine of the past.

This consists in the practice of reading episodically one of those gossipy, anecdotal, biographical books which

have appeared at various times during the last century. I must say of them that some are now inaccessible except in medical libraries. Among these may be mentioned: "Eminent Doctors" by G. T. Bettany (2 Vols., London, 1885); "Doctors and Patients" by John Timbs (2 Vols., London, 1873); "A Book about Doctors" by J. Cordy Jeaffreson (1 Vol., New York and London, 1861); "Professional Anecdotes or Ana of Medical Literature" (3 Vols., London, 1825), author not known, and "Physic and Physicians, A Medical Sketch Book" (2 Vols., London, 1839), author unknown.

I must commend also for general reading Sir Clifford Allbutt's little book on "The Historical Relations of Medicine and Surgery to the End of the Sixteenth Century" (London, 1905) and also a work by Knud Faber entitled "Nosography in Modern Internal Medicine" (New York, 1923). It is really a well-illustrated account of the evolution of modern internal medicine.

The volumes of the *Annals of Medical History* always contain interesting and informing material, and I can assure students and physicians that whoever knows well the writings of William Osler is an educated man.

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PAUL B. HOEBER, INC., New York, N. Y.

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Benjamin Wandrus
May 7, 1945